COMPUTERWORLD

JOURNAL

ELECTRONIC COMMERCE

THE NEW DIGITAL ECONOMY

BUSINESS GETS A NEW TWIST
AS COMPANIES GET
WEB'D FOR COMMERCE

FEATURE STORY:
UNCOMMON COMMERCE
The great bandwidth debate;
security fact and fiction;
org chart revisions

EDI MEETS THE INTERNET
A culture clash ensues
as old meets new

WHO IS
ELECTRONIC COMMERCE?

COMPUTERWORLD
ELECTRONIC COMMERCE JOURNAL

Welcome to the Premiere Issue of Computerworld Electronic Commerce Journal

This special magazine, from Computerworld's Journals Group is published to provide you with a very focused perspective on the technologies and management disciplines needed to build electronically-enabled business processes.

Through the pages of our weekly newspaper, Computerworld, our editors bring you the latest news and analyses on developments impacting this critical frontier of the Internet and the related tools organizations will need to conduct electronic business. Computerworld Electronic Commerce Journal extends this news with an in depth and provocative look at the issues and challenges you must meet and overcome as you weave the electronic fabric throughout your extended enterprise.

In this first issue of Computerworld Electronic Journal we bring you coverage concerning business-to-business and business-to-consumer electronic commerce and how these applications are being combined to derive operational benefit. We believe this is a perspective not offered in any other IT publication today. We look at the Internet as an enabling tool for applications such as electronic data interchange but only one of the necessary tools.

A second issue of Computerworld Electronic Commerce Journal will be published in September, continuing our commitment to providing Computerworld subscribers with the specialized information they need to achieve success with electronic commerce.

After reading this premiere issue of Computerworld Electronic Commerce Journal, please E-mail your comments to either one or both of us at the addresses below. Your feedback is invaluable as we plan our September issue.

Sincerely,

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FEATURE STORY

UNCOMMON COMMERCE

18 Even if you wanted to escape the Internet and the Web, you couldn't, with all the hype and coverage. But does the 'net have what it takes for electronic commerce? Yes and no: Issues such as payment and security are not hammered out. Yet companies from Alaska Airlines to Bank of America are working these glitches out.

COMPUTERWORLD ELECTRONIC COMMERCE **JOURNAL**

SUPPLEMENT TO COMPUTERWORLD

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A Portrait Of Electronic Commerce

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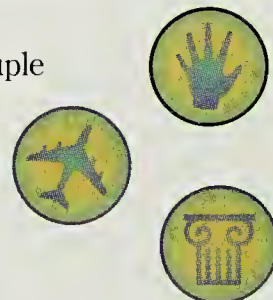
Don't Try This @Home

34 Everyone would agree that the Internet is wild and woolly, compared with the value-added networks of EDI. And though the 'net may never equal the tame world of EDI, it could come close. EDI vendors are promising to unbundle their services on the Internet, and smaller companies are attracted to the accessibility and lower costs. *By Tony Baer*

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20 With slow access lines and modems, 'net performance takes a beating. But pioneers claim bandwidth is second to other, more important infrastructure issues. *By Jeremy Schlosberg*

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28 Security is like the presidential campaign: Perception is bigger than reality. Despite advancements, fear of the 'net will keep a lot of companies from full electronic commerce deployment. *By Rochelle Garner*

DATABASE INTEGRATION: Unlocking The Database Door

24 We're all jaded by brochureware. But the cornerstone to an interactive Web site is hard to build: You've got to form a tight link between Web servers and corporate databases. *By Mark Halper*

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32 Most firms embarking on Web-enabled electronic commerce focus on the technology. But that's only half the equation: The other half is managing changing relationships and departmental roles. *By Alice LaPlante*

LOOSE CHANGE

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Trends, ideas and issues in electronic commerce

GET VERTICAL
A look at electronic commerce across various industry segments

IS THERE A BETTER WAY

EDITOR'S NOTE

Stepping Gingerly into the Electronic Commerce Zone

Welcome. You've just entered the electronic commerce zone! Station stop: the Internet and the World Wide Web. You've arrived at the brink of the so-called "digital economy," where traditional analog business borders cease to exist and technological ties extend well beyond fax machines and EDI networks.

At least, that's the way it's supposed to work!

The first thing you'll notice is that the Internet's beltway of Web sites is more like a side street Persian bazaar than a major commercial shopping thoroughfare. There's lots

money (debit accounts or funds transfers).

That's why the premier issue of *Computerworld Electronic Commerce Journal* explores the Web's thorny infrastructure shortcomings and the many remedies poised to go mainstream over the next few months or so. We examine this from a multiplicity of vantage points: from bandwidth and security concerns to Web/database coexistence to even the organizational makeovers and cultural shifts needed to make Web-based electronic commerce a reality.

Electronic Commerce Journal's sojourn may start with the white-hot Web, but the

> The **'NET** is more like a side street Persian bazaar than a major commercial **SHOPPING** thoroughfare. There's lots of hustle and bustle, product **HAWKING** and proselytizing.

of hustle and bustle, product hawking (colorful brochureware) and proselytizing, if you call digital malls and catalogs electronic commerce.

But you'll need to have credit-card dollars to burn (risk?) and the patience of a saint (let's face it, the Internet's no screamer most hours of the day) to join in the fun.

You'll also notice few business-to-business transactions going on, at least if you compare it with the transaction volumes coursing through value-added network providers or private corporate 'nets.

That's because the Internet was built not for conducting trade but for information and idea sharing — scientific and defense-oriented data, at that. The 'net still doesn't provide reliability and robustness (speed of service); bullet-proof integrity and authentication (for validating trading partners and encrypting transactions); or a foolproof way to collect

story doesn't begin — or end — there. Future *Electronic Commerce Journal* issues will visit a broad terrain of topics, including the evolution of virtual corporations and the tightening of bonds between suppliers, distributors, retailers and end customers via the Web, E-mail, fax, EDI, collaborative software and videoconferencing.

We hope you'll join us and offer suggested stopping points along the way (see my E-mail address below) to make our journey more instructive and fulfilling.

So step gingerly and don your hard hat. Our first stop, an exploration of electronic commerce's underpinnings, is a "site" definitely under construction.

Alan Alper

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HOW CAN
I GET OUR
ELECTRONIC COMMERCE
PROGRAM UP TO SPEED?

On-line Catalogs Are Booting Up

Business-to-business catalogs are seen as the first major application on the 'net

What costs $8 million to $10 million a year and is out of date as soon as it's finished? Paper-based catalogs of electronic parts at AMP, Inc., an electronics manufacturer in Harrisburg, Pa. "Paper is terrible," said Jim Kessler, director of global electronic commerce. "As soon as you ship, the information could be a month out of date."

It's a well-known problem for manufacturers such as AMP [www.connect.amp. com], which publishes 400 catalogs a year with life spans averaging 24 months. In addition to cost, catalogs are search-intensive for customers.

Which is why experts predict the quick rise of business-to-business electronic catalogs on the Internet — one of the

few ways to provide quick searches of up-to-the-minute data for a relatively low cost.

Already, whole businesses are being built around the electronic catalog concept. There's Part.Net [www.part.net], a service run by NTec in Salt Lake City that enables attribute searches among manufacturers. Then there's Pittsburgh-based Industry.Net [www.in-dustry.net], which is more like a directory service that represents subscribers on the site.

Saqqara Systems, Inc. in Sunnyvale, Calif. [www.saq-qara.com], offers shrink-wrapped catalog software called StepSearch. In fact, AMP is one of Saqqara's biggest customers. Using Saqqara's design and integration services, AMP launched its on-line catalog in January.

The search engine is built on Oracle Corp.'s Oracle7 database and runs on a 34G-byte, four-processor Sun Microsystems, Inc. SPARC 1000. Particularly innovative is that the system is not based on static pages; each search is customized, based on parameters input by the user.

But AMP is definitely walking before it runs. Users cannot yet place orders or access price or availability. This is par for the course. Among Part. Net's 15 or so subscribers,

only a few enable users to order over the Internet. By year's end, AMP hopes to link the server on the public side of its firewall into its corporate databases, enabling ordering.

Even without ordering, AMP anticipates a one-year return on investment for the $1.5 million to $2 million project. Expected savings will come from reduced publishing costs, telecommunications costs and phone support.

Already, an industry debate is raging over which model will survive: companies producing their own catalogs and being represented in a forum such as Industry.Net or the Part.Net model, which pits vendors against one another.

There's room for both, said Michael Sullivan-Trainor, an analyst at International Data Corp. in Framingham, Mass. "The business-to-business catalog has two flavors: one for secured, continuing clients, the other to generate new relationships. The secure one will likely be hosted on an internal Web site with special access granted to business partners. The other catalog will likely be hosted in public forums."

— MARY BRANDEL

COMMERCE BY NUMBERS

Companies are spending from $840,000 to $1.25 million to develop Internet-based interactive commerce sites — four times more than expected. Development takes one year — twice as long as expected.

STAFFING, DESIGN AND DEVELOPMENT	**64%**
HARDWARE	**16%**
SUPPORT FOR 12 MONTHS	**16%**
OFF-THE-SHELF SOFTWARE	**4%**

Base: 20 sites
Source: International Data Corp. with Connect, Inc.

Meanwhile, businesses plan their use of the Internet.

PERSON-TO-PERSON E-MAIL	**39%**
CUSTOMER SERVICE	**38%**
PRODUCT CATALOGS	**30%**
EDI DATA TRANSFER	**27%**

Base: 990 EDI users
Source: The EDI Group Ltd.

While EDI is growing at more than 20% per year, E-mail/EDI is today the smallest portion of the total electronic commerce market ($45.5B in 1995).

E-MAIL/EDI	**29%**
OTHER COMMERCE MESSAGE TRANSFER	**34%**
FAX	**37%**

Source: The EDI Group Ltd.

What's In a Name, In Case You're Wondering

A rash of new job titles reveals that electronic commerce is making its mark

BY MARK HALPER

Look closely at that pocketful of business cards you came home with from the last Internet or information systems conference, and you might notice something different.

In a sign of the times, corporations are beginning to bestow "electronic commerce" titles on the individuals charged with developing and maintaining the on-line conduits and meeting places for vendors and customers.

"You're seeing an evolution from the old days, when people had titles like EDI director," said Jonathan Morell, a principal member of the technical staff at the Industrial Technology Institute's Center for Electronic Commerce in Ann Arbor, Mich. "Now there are a lot more business processes and more technology to it, and that's reflected in the new titles."

Andrew Gammuto is one of the new club's members. As support leader of electronic commerce at Baltimore Gas & Electric Co., Gammuto couldn't be more on the edge of change. He keeps up with the rapidly evolving Internet and Web technologies.

But also, as BG&E breaks out of its protective shell into a competitive, deregulated environment, he will be helping the utility find new services to market and new ways to market them.

One massive undertaking involves tying the company's mainframe-based customer support and billing system to its Web site so customers can get usage quotes or bill status off the Web. Such services are necessary as consumers win more regulatory approval to choose their power providers. BG&E can also help customers select lower-rate hours for certain energy-consuming activities, such as running a washer and dryer, Gammuto said.

As manager of electronic commerce at Campbell Soup Co. in Camden, N.J., Karen Ogren's role is similar to Gammuto's. "We have our foot halfway in every re-engineering project at the company," she said.

Ogren's group maintains inventory links with some of Campbell's customers and hopes to soon bring those customers into Campbell's electronic-mail system.

More electronic commerce managers are likely to appear. "It may just be that it's the right buzzword to use these days," Morell said. "But then, electronic commerce has become more than just the exchange of structured business data."

Halper is a freelance writer based in San Francisco.

THE NEXT 15 MINUTES

Many Web business CEOs have already enjoyed time in the spotlight

☞ **JIM MANZI, CEO, INDUSTRY.NET, PITTSBURGH**
[www.industry.net]
Seven months after IBM bought billion-dollar Lotus, Manzi joined this 5-year-old provider of business-to-business on-line products and services. Industry.Net is best known for its 26 on-line marketplaces that enable vendors to present their products and services to potential buyers. The company claims to host 4,000 subscribers and 180,000 buyers. It plans to beta-test on-line transactions sometime this year.

☞ **GARY EICHHORN, CEO, OPEN MARKET, INC., CAMBRIDGE, MASS.**
[www.openmarket.com]
Before joining Open Market in December 1995, Eichhorn held executive positions at two very traditional systems providers. He was general manager of the medical products group and oversaw workstations and servers at Hewlett-Packard Co. In addition, he held executive roles at Digital Equipment Corp. Founded in 1994, Open Market sells business software and services for the World Wide Web.

☞ **JERRY KAPLAN, CEO, ONSALE**
[www.onsale.com]
Kaplan is best remembered as the founder of Go Corp., the now-defunct maker of pen-based computers. As the Internet rose in popularity, he struck on the idea of real-time interactive auctions and in July 1994 formed his new Web business, OnSale. OnSale holds auctions for new, refurbished and close-out computers and electronics. Kaplan said he's had 300,000 visitors to date and has been profitable since November 1995.

IS ADDING ELECTRONIC TRADING PARTNERS

Commerce**PULSE**

What's next in products and the market

LEADING THE EDGE

What do the leading-edge Web developers have up their sleeves for 1997? Here's the scoop, according to a recent study by market research firm Forrester Research, Inc., which surveyed 30 Fortune 1,000 companies.

PRODUCT MARKETING INFORMATION	93%
ON-LINE TRANSACTIONS	73%
GROUPWARE	70%
CUSTOMER SERVICE	57%
INTERNAL SERVICES, DIRECTORIES, LINKS	40%
INFORMATION COLLECTION	30%

Market**WATCH**

SATURATED MARKETS — ALREADY?

While commerce is slow to start in many industries, the CD music business may be saturated. In fact, with successful Web businesses such as CDnow, it's too late to break in as a CD Web retailer, said Pam Kostka, director of product marketing at Connect, Inc., an electronic commerce systems provider. So get on the Web now, she advised.

CLOSED FOR BUSINESS

By December 1996, 20% of Fortune 500 companies with commercial Web sites will have stabilized or closed them, as "users who are underwhelmed by the 1996 content on the Web cancel and turn on their TVs," according to a December 1995 report by International Data Corp.

HOT SKILLS

A recent survey asked 202 IS professionals to list the skills needed to handle Web requirements

HTML	57%
SERVER ADMINISTRATION	55%
DESKTOP SUPPORT	52%
WINDOWS NT SERVER	48%
UNIX	43%
SQL	39%
JAVA	38%
SOUND/VIDEO EDITING	28%
VRML	23%
CGI SCRIPTS	21%

Source: @computerworld, Computerworld's Electronic Media Division

Product**WATCH**

Coffee grounds

Like a java maker with that Internet toaster? If Sun has its way, devices from cellular phones to printers will soon have embedded microprocessors optimized for Java-built applications. Users of these virtual machines, including a Sun-built Internet access device slated for delivery this year, could send and retrieve applets or multimedia data via the Web. Java firmware should help hardware companies use the tool's design features: Code is reusable; it supports multithreaded operations; it's built for distributed computing; and it's architecture-neutral. Time will tell whether Java's perky enough.

Sniffing for trouble

Did you take the *Field of Dreams* approach with your Web site (if you build it, they will come)? But if they come, how will you manage traffic spikes or troubleshoot hot spots? Enter Network General and its family of fault and performance management tools: Sniffer Network Analyzer. The firm [www.ngc.com] is planning to unveil in June a module for its stand-alone and distributed Sniffer products that will decode and analyze the leading communications protocols supported by Netscape Web servers, including HTTP, Telnet, NNTP, FTP and Gopher. Web administrators will be able to see whether a router or server is overloaded with traffic, according to Malcolm Aldridge, a Network General senior product manager. They'll also be able to analyze throughput per connection and measure the time it takes for a "get" command to travel from Web browser to server and back.
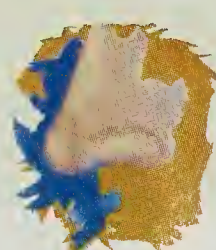
Say goodbye to slow

Telecommuters and consumers can try out cable modems this year, as trials turn into actual services. The modems, which receive video and data over fiber-optic lines, are expected to ship from HP, Zenith Electronics, Motorola and others. The biggest draw is speed: Cable modems can receive data at 4M bit/sec. — a lot faster than ISDN, at 128K bit/sec. Sending data is quite a bit slower, however, and standards have yet to be set. But services cost $15 to $40 per month for unlimited use, compared with ISDN, which costs about $45 per month before per-minute fees, according to Forrester Research.

Pay-up time

Electronic payment is a major obstacle to electronic commerce, and VeriFone, Inc. wants to own the solution. VeriFone owns 80% of the U.S. retail electronic payment business. This year, it's promised to unleash the first fruits of a payment system for merchants, banks, credit-card companies and consumers that it hopes will become the equivalent of that business for the Web. Later this year, VeriFone intends to provide an Internet interface to existing financial networks by combining Netscape's gateway software with its payment software. For merchants, the company will bundle its "virtual POS terminal" software with Netscape's server. In the third quarter, VeriFone and Oracle will integrate Oracle's WebServer with the virtual POS product so merchants can process credit cards over the 'net. For consumers, VeriFone's Pay Window will be embedded into Oracle's PowerBrowser. The two will also create an Internet gateway to interface with legacy banking databases.

HOW DO
I TAKE
CUSTOMER
SERVICE
TO THE
NEXT LEVEL?

JUST ASK US. To get beyond typical customer service, you have to go beyond the typical customer service drill. That's exactly what Stanley Works, a worldwide tool and hardware manufacturer, did when it committed to a comprehensive electronic commerce program. With the help of Sterling Commerce, Stanley is reducing lead times and improving accuracy by doing business electronically. In many cases, lead time has been cut from six days to one day.

Currently, more than 80 percent of Stanley's consumer business documents — purchase orders, advance ship notices and invoices — are processed electronically, and Sterling Commerce is helping the company explore additional applications. By using electronic commerce, Stanley Works is better serving its customers, providing the right products at the right time in the right place. And that's a point worth hammering home.

WHAT CAN I DO TO PUMP UP MY PRODUCTIVITY?

JUST ASK US. What if you could eliminate the overhead of processing paper invoices? Substantially reduce inventory and warehouse costs? Or centralize EDI processing and file management? With help from electronic commerce expert Sterling Commerce, Mobil Corporation struck it rich, accomplishing all three and more.

In a global strategic alliance, Sterling Commerce is providing its CONNECT, COMMERCE and GENTRAN software and consulting services to support Mobil's incorporation of electronic commerce into all facets of the company. For Mobil, the partnership is changing the way they do business. "Mobil's productivity has increased dramatically during the eighteen months since we restructured our EDI operations," Roger Trout, Mobil's electronic commerce coordinator states proudly. Equally proud is Sterling, who in all that time, plus years before, has never lost a Mobil transaction.

Pretty slick. And it proves that even for a well-oiled EC operation like Mobil Corporation's, it pays to ask questions.

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800-305-0315
614-791-6499
FAX 614-793-7221
http://www.stercomm.com

Get Vertical

MANUFACTURING

Campbell Soups Up Inventory

The food giant plans an electronic means for customers to replenish shelves

BY MARK HALPER

When it comes to managing its finished goods inventory, Campbell Soup Co. has had a pretty good system going — if it needed to manage only 30% of its inventory. A 3090 mainframe receives daily updates from participating supermarkets, and when inventory dips, the system automatically replenishes the soup, salsa or whatever other Campbell product is needed.

The problem, according to Ron Ferner, vice president of low-cost business systems at Camden, N.J.-based Campbell, is the other 70% of inventory not managed on the system. Many of Campbell's customers are not comfortable handing over their purchasing decisions to Campbell.

So Campbell, which has been running the mainframe-based customer replenishment system for about four years, is trying to create a system it hopes will cut inventory costs as dramatically as the mainframe system did. Not an easy task, considering the mainframe lopped $60 million off hundreds of millions of dollars of annual inventory costs.

Ferner was certainly starting with a clean slate. The balance of orders the replenishment systems don't process are paper-based and prone to ending up in the wrong Campbell plants and offices.

The new electronic commerce system, which Ferner hopes to phase in by year's end, will be based on an IBM RS/6000 parallel processor running an Oracle Corp. database. It will house two components that take finished goods inventory information off an AS/400 and whip it into electronic commerce action.

Campbell has hired IBM's Integrated Systems Solutions Corp. to deploy and maintain the system.

One piece, an order processing application from Industri-Matematick, Inc. in Sweden, will let Campbell centralize orders now scattered throughout 13 regional offices. A second piece, from Rockville, Md.-based Manugistics, Inc., will facilitate sales order forecasting and assist Campbell's inventory planning.

Here's how it works: Customers send an order to Campbell via MCI Mail. The Industri-Matematick system processes the order and

Please turn to next page
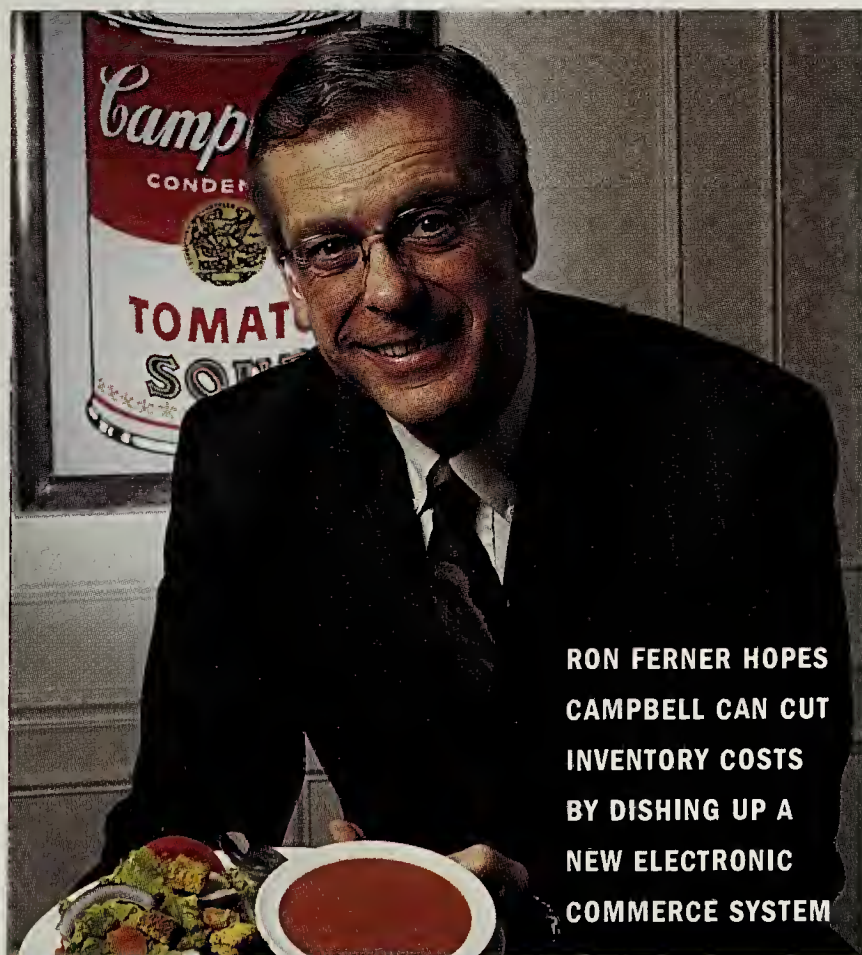
RON FERNER HOPES CAMPBELL CAN CUT INVENTORY COSTS BY DISHING UP A NEW ELECTRONIC COMMERCE SYSTEM

Continued from page 11 feeds it to the Manugistics program. Manugistics compares the order against inventory and rolling sales information, which can help sales managers decide how much of which products to make and where.

The system also tracks inventory and can advise customers when to replenish. It then electronically tells customers which goods are on their way and when they'll arrive. "Today, they have to wait until the truck shows up to see if they got what they asked for," Ferner said.

He declined to say how much the two components cost but said they are part of a $26 million re-engineering project that affects other aspects of the company as well. For instance, the Oracle database serving the inventory and planning applications will anchor a central customer support and complaint center in Cherry Hill, N.J.

According to Ferner, customer support is in dire need of such an upgrade. "If I were a customer of Campbell Soup, sometimes I would wonder who to call for answers to which questions," he admitted.

Ferner declined to elaborate on Campbell's predicted return on its investment except to say that given the economies of scale derived from leveraging the RS/6000 across various operations, "we justified it."

Campbell has plenty of incentive to bring its RS/6000 projects in on schedule. "We're not going to miss a beat," Ferner said. "We can't afford to." ◀

Halper is a freelance writer based in San Francisco.

INSURANCE

Is the World Ready for Web Quotes?

If anything could rock the insurance industry's conservative world, it's the World Wide Web. The question is, are consumers and the industry ready for cyber insurance agents?

Pacific Specialty Insurance Co. apparently thinks so, as does the Utah division of Workmen's Auto Insurance Co. Both have signed on with InsWeb [www.insweb.com], a year-old company that intends to offer a Web-based comparative shopping service where consumers can purchase insurance and get competitive quotes on-line.

That's the vision. About 20 firms have signed on, but few are providing quotes or selling insurance. Pacific Specialty sells watercraft insurance, but Workmen's Auto generates quotes and refers consumers to an agent for purchasing.

Another service, Quick-Quote Insurance Agency [www.quickquote.com], offers an interactive quoting and comparison system for term life insurance and fixed annuities. Users fill out on-line applications and receive five of the least expensive A rated term life or A+ rated annuities.

These services were first seen as a way to cut the high cost of using agents. But consumers might be squeamish about giving up private information, "especially for health and life insurance," said Barbara Smiley, an analyst at

the Tower Group in Boston. That's why these services might be more attractive to agents.

"In the long term, people might go to the Web on their own. But they'll have to be educated as to whether a company is going to sell that information to someone else," said Stan Lepeak, an analyst at Meta Group, Inc.

Even then, efficiencies will be reached only when Web forms are integrated with an agency automation or policy management system, said Debbie Wilson, president of DK Wilson Associates in Mississauga, Ontario.

It takes time for an insurer to reorganize itself, and "it's also a complicated task to allow insurers to sell insurance on-line" because of state regulations, said Darrell Ticehurst, president of InsWeb.

And some observers don't see the Web as a place to buy insurance at all. "Where the Internet comes in is customer service. There's a richness there you're never going to get from a brochure or phone call," said Patrick Vice, proprietor of the Electric Coffeehouse, a consultancy in Toronto. ◀

— **MARY BRANDEL**

GOVERNMENT

State DOA Bids Poky Paper Adieu

Nowhere is government bureaucracy more grating than in purchasing. Overburdened functionaries sift through reams of static, often ancient paperwork

and/or microfiche to figure out which approved products are most cost-effective.

That approach didn't work in the past, let alone now when PCs and peripherals change configurations and prices as often as models change outfits at a fashion show.

To cut the best deals possible, a number of state governments are turning to the Web to invite bids and provide data on approved vendors.

Witness the state of North Carolina, which last July posted PC/peripheral pricing and request for proposal information on the state's Department of Administration (DOA) Web site [www.doa.state.nc.us/PandC/]. In six months, roughly $60 million in microcomputer purchases was made from contracts derived from the Web, according to King Prather, assistant purchasing administrator.

The key, Prather said, is that the Web lets him update pricing information within 24 hours to "wired" state agencies, towns and cities, public schools, state universities and hospitals. Data is supplied by vendors on Microsoft Corp.'s Word or Lotus Development Corp.'s 1-2-3, and an in-house-built macro generates appropriate Hypertext Markup Language (HTML) code. In the past, prices could be updated only monthly, at best.

In September, other commodities such as furniture contracts and bid data were added to the site. "Say a community college wants to install new bleachers. They can see if anyone else has purchased anything similar and share information with them," he said.

The DOA's purchasing and contracts home page received

WHO CAN KEEP MY DATA COMMUNICATIONS SYSTEM HEALTHY?

over 10,000 hits in January. "We believe that's the biggest number of hits on the state's home pages so far," said Dell Pinkston, an information systems consultant on the project.

Because DOA IS staffers were Web neophytes, they built their site with what they knew best: Microsoft's Foxpro for Windows 2.6. Multiple tables were generated to house the data. From there, Foxpro reports were created and enhanced with HTML.

An integrated purchasing approach can't be divined until the Web site links to the state's new accounting system and all state and municipal offices can access the Internet.

Web applications "are a priority, but it's hard to do. There's no state mandate [for access], and I don't have control of everyone's budget," said Bill Coleman, the DOA's IS director. ◢

— ALAN ALPER

HOT SHOPPING

Retail sites that epitomize the latest and greatest in retail on the Web

HAWAII'S BEST ESPRESSO CO.
hoohana.aloha.net/~bec/
The husband and wife who own this onetime retail store closed shop and turned it into a 100% Web business when their rent skyrocketed. Visitors can buy several varieties of Kona coffee and have their order shipped priority mail. Brag points are low prices and easy ordering.

CDNOW
THE INTERNET MUSIC STORE
www.cdnow.com
This venture was started by 26-year-old twin brothers in Penllyn, Pa. The site claims to offer every album sold in the U.S., promises two-day delivery ($4.95 minimum charge) and accepts returns. Visitors can order CDs via credit card using Pretty Good Privacy, or PGP, encryption.
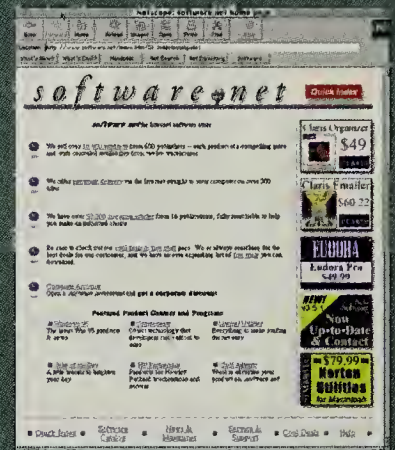
CYBERSOURCE
www.software.net
This site sells over 10,000 software products from 600 publishers and components for software developers. After buyers fill out an order form, their credit card is validated and cleared for shipment, and electronic-mail confirmation is sent. According to Bill McKiernan, CEO, the year-old company generated $1 million in sales in 1995.

FINANCE

Brokerages Invest In Web Futures

By year's end, a number of investment firms will offer Web-based transaction systems. One of the first is Charles Schwab. In March, a limited number of customers began checking balances and stock quotes, placing trades and changing orders over the Internet via Netscape browsers. Withdrawals require a phone call or electronic-mail message, said Art Shaw, senior vice president of electronic brokerage systems. The system will expand to the general public this year.

By midyear, The Vanguard Group, Inc. in Valley Forge, Pa., plans to offer account lookup, transfers, redemptions, purchases and new accounts over the Web. We spoke with Bob DiStefano, senior vice president of information technology at The Vanguard Group.

ECJ: *What is your philosophy toward electronic commerce?*
DISTEFANO: If you view the Web as the next 800 number, you take a whole different attitude toward it. In the long run, people will get over the technology. What matters is the quality of content, the helpfulness of the people, the sophistication of the information.

ECJ: *What are your thoughts on security?*
DISTEFANO: Some people say the Internet is not secure at all. Others say it's more secure than Touch-Tone. We're somewhere in between. By the end of this year, there will be levels of security at least as secure as on Touch-Tone.

ECJ: *Is there one development in particular that will clinch it?*
DISTEFANO: Encryption capability at the browser level.

ECJ: *How does your own system handle security?*
DISTEFANO: The first line of defense is the policy decision. If you allow people to redeem to a third party, your exposure is greater than if you allow them to redeem to an existing record.

The other thing is encryption and passwords. We introduced a product last August for 401K plan sponsors to check accounts on our Web server (not through the Internet) through a customized Spyglass browser. We could connect it to the Internet, but we wanted to further customize the browser to prompt for passwords and encrypt that information.

For general Web access, we have to deal with a variety of browsers, so that's why we're taking a bit longer there. ◢

— MARY BRANDEL

HOW DO I SATISFY A RETAILER'S APPETITE FOR ELECTRONIC COMMERCE?

Portrait of Electronic

Applications

Individuals may initiate transactions, but increasingly applications will do so without human intervention. For example, an inventory control system may detect a reorder point, calculate an order quantity and pass a requisition to the purchasing system. Its rules may determine that intervention is required.

The EC Broker

Brokers use X.500 directory services to look up addresses and route messages to a fax number or Internet, VAN or E-mail address. For traditional EDI, the electronic commerce (EC) broker would also create the appropriate EDI format and route the message to the communications interface. EC brokers today are a mix of messaging management systems, EDI software's X.500 directory systems and storage systems. Soon, these brokers will also support Open EDI.

Communications Interface

This software module formats and transmits the message over one (or more) communications medium. It was designed as a separate software component to allow for additional EC media in the future. While the EC broker handles authenticated information in plain text, the communications interface is responsible for all of the necessary security-related conversions. An example is Premenos' Templar software.

Functions:

- Purchasing
- Accounts Payable
- General Ledger
- Inventory
- Asset Maintenance
- Cash Management
- Order Management
- Production Scheduling
- Claims Processing

Functions:

- Archive
- Reporting
- Messaging
- Translation
- Auditor

Corporate Firewall

VAN Interface

EDI Mailbox

Fax Interface ← **E-Fax**

Internet Interface ← **Mailbox**

Agent Interface ← **Agent**

Various applications send messages to the EC broker. Each message identifies the sender and receiver, the message type (purchase order, receipt, etc.) and the message contents. Messages are transported by a variety of methods (TCP/IP, X.400, SNA).

The EC broker hands the properly addressed message to the communications interface. Acknowledgments and other responses are passed back to the EC broker for logging or forwarding back to the appropriate application.

An intelligent agent is a rules-based application that can transport itself from site to site over the Internet, in search of requested information. These products are just now emerging and include such concepts as Telescript and Safe-TLC.

Corporate Web Server

Commerce

While few organizations have integrated all of the facilities described below, they are all available or being tested today.

External Network

Trading partners are accessible via telephone, public VAN or the Internet. Though not shown here, any trading partner could be accessed through any of the three network types.

Trading Partner

Trading partners are all those external organizations with which a company exchanges information. Each may have a Web site and/or a communications gateway.

EDI Value-added Network

Phone

Internet

- Vendor
- Customer
- Bank
- Transportation Carriers
- Insurance Companies
- Government
- Health Care Providers
- Trade Exchange
- Electronic Catalogs
- Credit-card Authorization
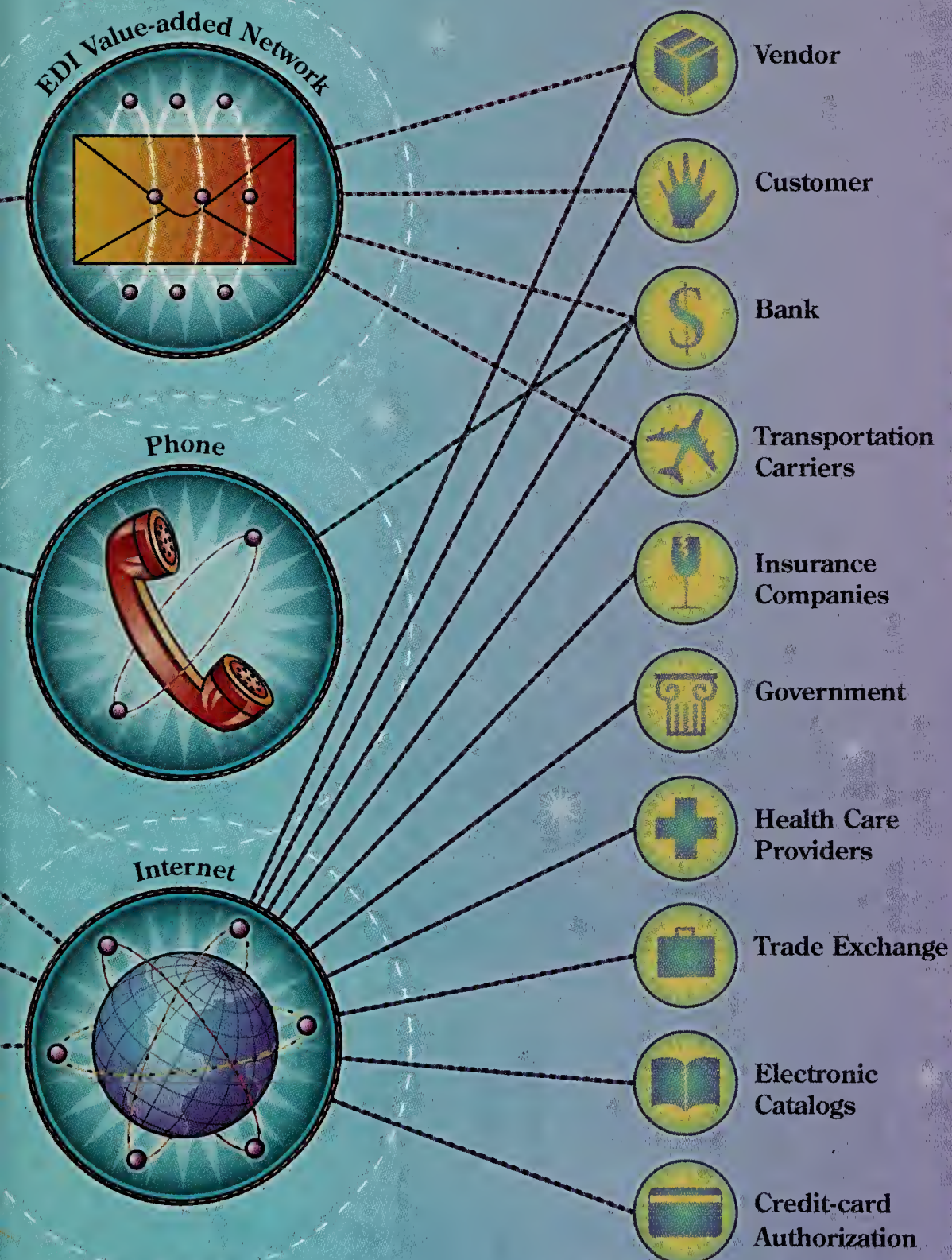
ONE STEP AT A TIME

A good way to understand this diagram is to think of a purchasing system. To initiate a transaction, an employee might access the system directly, through an intranet Web site or via Lotus' Notes. Or an inventory control system, for example, might detect a reorder point, calculate an order quantity and pass on a requisition without human intervention.

At that point, the purchasing system must determine whether the item is established in the system; identify potential vendors; get availability and pricing; figure out which vendor to place the order with; place the order; pay for the item or confirm credit; and verify receipt.

The system's rules may call for human intervention, but in the next five to 10 years, transactions will increasingly become automated.

If potential vendors must be identified, the system may either launch a Web browser for human use or delegate intelligent software agents to search the Web. Tools such as Sun's Java can provide an interface between the vendors and the purchasing system.

Once vendors are identified, the system (or person) places the order. Payment may transpire through credit cards, digital cash transaction (DigiCash, Ecash, etc.), third-party payment services (such as First Virtual) or confirmation of credit combined with traditional billing and payment. Naturally, authentication and encryption technologies are used.

In the near term, many vendors may be contacted by traditional value-added network-based EDI, E-mail or fax. In the longer term, intelligent agents launched by rules-based systems will exchange most of the information over the Internet.

As this happens, EDI and E-mail response times will be reduced to minutes or even seconds. Vendors that cannot respond quickly and accurately will be unable to compete.

Today, many organizations are successfully "faking it" by getting employees to respond rapidly to EDI and E-mail requests for proposals and purchase orders. But as required response times drop to minutes, then seconds, only rules-based systems will be able to handle transaction volume quickly and accurately enough to meet expectations. Employees will deal with occasional exceptions and manage the effectiveness and improvement of the overall business process.

UNCOMMON COMMERCE

READY OR **NOT,** COMPANIES ARE GETTING WEB'D FOR **COMMERCE.** BUT GLITCHES REMAIN — NAMELY, PAYMENT, **SECURITY** AND INTEGRATION.

It's in the newspapers. It's on the radio. It's probably even cropped up at your latest social gathering. It's the Internet and Internet-based electronic commerce.

Proponents of the World Wide Web and the Internet preach that this technology phenomenon can and will cure the world's ills, from trade barriers to civil war. Detractors, on the other hand, say the Internet is the CB radio of the '90s. Indeed, for all the money being poured into Web-based commerce systems (an International Data Corp. study puts the range of site development between $300,000 and $1.5 million), few if any have claimed to actually be making money on the Web.

OK, let's just get ahold of ourselves.

It's hard to argue that the Web will have zero impact on future business. It's gone too far for that — you can even order Girl Scout cookies over the Web.

Outside of true commerce, Internet technology solves too many problems to just go away. Network access, platform incompatibilities, client interfaces — these traditional IS headaches fade in the face of downloadable, platform-independent browsers and preexisting networks. "The Web will loosen up a backlog of projects previously deemed too expensive or complex," predicted Frank Gens, an analyst at IDC.

But is it ready for robust, secure electronic commerce? As our stories over the next few pages show, much depends on how you define it. If electronic commerce means increasing self-help customer service or starting a small business selling wine, come on down.

But if you're more rigorous in your definition — say, establishing one-to-one consumer marketing strategies or building a secure network for business transactions — you'd better lower your expectations.

Here's the reality: While it doesn't take rocket science to build Web servers, home pages and firewalls, companies are still struggling to glue those elements together into session-based, performance-friendly, secure systems.

> OF 202 IS PROFESSIONALS,
> ONLY **15%** SAID THEY
> PLANNED TO PURCHASE
> COMMERCE/TRANSACTION
> SOFTWARE IN THE NEXT YEAR.
> THE MAJORITY — **30%** —
> PLANNED TO PURCHASE
> COMMUNICATIONS SOFTWARE.

The top bottleneck is payment, said Marty Tenenbaum, founder of CommerceNet, a consortium that promotes Web commerce. "There's over 100,000 commercial sites, but the highest estimate of dollar commerce is $20 million a year. So there's not a lot of commerce going on. What's stopping it is the ability to get paid."

Consider these additional issues:

PAGE 20. THE CONTENTIOUS ISSUE OF BANDWIDTH. Internet pioneers claim its infrastructure is sufficient for now. Others contend that a new highway must be built. Meanwhile, most of the world still operates on 14.4K modems — hardly the backbone for meaningful trade.

PAGE 24. WEB/DATABASE INTEGRATION. Less talked about but equally daunting is the money being spent on custom code, mainly in the interest of establishing some level of interactivity.

PAGE 28. SECURITY. The biggest nut to crack is security — both perception and reality. Vendors would have you believe encryption and authentication are here; implementers say it's possible to build impenetrable networks, but only if you've got the skills and know-how.

PAGE 32. ORGANIZATIONAL ADJUSTMENTS. As important as it is to learn and implement new technology, firms are also just starting to adjust organizational structures to meet the demands of electronic commerce.

But take note: Companies are working hard to solve these deficiencies. Small companies such as Virtual Vineyards are upgrading their Web/database integration to provide faster, more satisfying on-line shopping. Business-to-business electronic catalog suppliers are building downloadable browsers to make searches more meaningful. Automotive companies are banding together to build their own Internet-within-the-Internet to lessen the cost of EDI.

Meanwhile, a new market is being built around Sun Microsystems, Inc.'s Java, a language that holds promise for more interactive electronic commerce systems. And systems and database vendors are cutting the costs of custom-coding by building in turnkey capability.

So will true electronic commerce become a reality? If we knew, we'd be millionaires. What's undeniable is that companies are spending big bucks to make Internet-based commerce work to their advantage. Will money be wasted? Undoubtedly. But smart companies will balance the importance of getting on the Web quickly with the need to target efforts to their competitive advantage.

— **MARY BRANDEL**

It's the BANDWIDTH, STUPID...
OR IS IT?

SURE, WEB ACCESS IS SLOW.

BUT BEFORE YOU CRY 'BANDWIDTH,'

CONSIDER THESE OTHER MORE

IMPORTANT INFRASTRUCTURE ISSUES.

The U.S. business press has wasted no time going from barely recognizing what the Internet is to bellyaching about how its insufficient infrastructure prevents us from really profiting from the doggone thing.

There are, to be sure, reasons for grumbling about the none-too-speedy Internet. But what, if any, are the real-world implications for business? How important is it that the underlying technology is decades old? Does it matter that electronic commerce was the last thing on the minds of the Internet's designers and pioneers?

While a sort of freak accident, some say last fall's Internet brownout is a good answer to such questions. September's three-hour service interruption was caused by a user in Japan who attempted to broadcast a message to the entire Internet community. It clogged routers along MCI Communications Corp.'s portion of the Internet backbone and caused particular trouble for users seeking to access popular Northern California-based Web sites.

And it doesn't take a brownout to frustrate even the most patient Web surfer. Some companies actually forbid Internet access during infamously slow peak usage hours just to keep their networks and modem lines open.

Of course, Web performance isn't always the fault of the Internet itself. It's only as strong as your weakest link, whether it be a slow Web server, a 14.4K bit/sec. modem, a 10M-byte Ethernet backbone or a 56K-bit access line.

But by some accounts, the Internet is poised to fall victim to its own success. As the number of users multiplies, the number of paths leading to the Internet renders communications

BY JEREMY SCHLOSBERG

among its patchwork of component networks increasingly less straightforward. Meanwhile, the aging backbones — both the switches and the mix of T1 and T3 lines — prove a less and less capable conduit for the traffic crushing through them, which could reach 10T bytes on a good day, according to Eric Schmidt, chief technology officer at Sun Microsystems, Inc.

As far as Einar Stefferud is concerned, the Internet "is running at the bare edges of acceptable performance." Stefferud is founder of First Virtual Holdings, a middleman organization for World Wide Web-based commerce. He experiences and hears about enough isolated outages, from local independent software provider "meltdowns" to random connectivity lapses, to be convinced not only of the Internet's existing problems but also of its future ones. "Performance is threatening to get worse," he asserted.

That will be especially true, some experts say, when U.S. business clambers aboard in search of full-fledged electronic commerce. "The Internet is not geared toward nor does it have the infrastructure to support broad, interactive commerce applications," said Christine Heckart, director of broadband consulting at TeleChoice, a Verona, N.J.-based consulting firm.

To Heckart, the issues go beyond routers, switches and line speeds. She pointed instead to the lack of a sophisticated billing infrastructure that electronic commerce of the future will require, such as usage-based charging and the ability to send payments to more than one place (due to royalty considerations, for instance).

But for the general public, it all boils down to one thing: the B-word. If you want to sound smart when it comes to infrastructure problems on the Internet, just say "bandwidth."

Too bad the bandwidth issue, from a business perspective, is a bit of a crock. Certainly there are performance problems, and some of them would be improved with faster lines and switches.

In fact, the Internet's insiders are working to improve bandwidth: the supernetwork's 11 core routing links are being upgraded from 45M bytes to 155M bytes, according to Schmidt. And a few of the Internet service providers, including Netcom On-Line Communication Services, Inc., UUNet Technologies, Inc. and Performance Systems International Network, have or plan to incorporate high-speed switching systems from Cascade Communications Corp.

The National Science Foundation is offering grants to scientists and engineers to speed the flow of scientific and technical data over the 'net. And Inter-

net service providers are expected to offer higher-speed connections that fall between T1 and T3 speeds (1.5M and 45M bit/sec., respectively). So far, UUNet and MCI have introduced 3M to 10M bit/sec. connections.

But the people most genuinely involved with the realities of doing business on the Internet today, rather than those offering a vision of what it's going to be like someday, are the ones least concerned with bandwidth issues.

"The backbone infrastructure is adequate," said Eric Bataller, technical liaison at CommerceNet, a trade association promoting use of the Internet for business. For business use in particular, he said, the issue is not so much that there aren't enough "lanes" on the highway; much more crucial is how the traffic is getting coordinated. These are "hard-core routing issues," he said, that deal with the logistics of how data makes its way around the Internet.

"As far as the underlying network goes, there's no problem," affirmed Leonard Kleinrock, professor of computer science at the University of California at Los Angeles, adding that the Internet will get upgraded on an as-needed basis. And he should know, being one of the principal architects of the Internet, when it was born as the

BEYOND BANDWIDTH

Those who have thought about what conducting business on the Internet really means (which for now has a lot more to do with information distribution than with transactions) are far less concerned with theoretical gee-whizzness and far more attuned to the global network's more immediate technological shortcomings. The most significant infrastructure issues, they said, stem not from inadequate individual components but from the inadequate, decentralized whole the components create.

"If the Internet breaks today, good luck figuring out where the trouble is, not to mention whose responsibility it is," said TeleChoice's Christine Heckart. For businesses to rely on it, there has to be far better network management. That means the ability to guarantee service levels as well. Another issue that lacks the sexiness of the bandwidth problem is standards. While protocols are standardized, the way data is processed is not. "There are no standards for conducting the sort of basic commerce everyone's talking about," said Ram Sriram, manager of the AI Center at Lockheed Martin Corp.

From bidding to quoting to contracting, he said, common formats and protocols are a necessity and must go far beyond the scope of electronic data interchange, which he deemed "very limiting."

On a smaller scale, Web pages will have to support one another as well. It seems logical, for instance, that a user shouldn't have to type in his name and other account information each time he accesses a Web site on which he might be conducting business. The site should be able to "read" this information from the user's computer.

"I think commercial use is going to roll out slower than people anticipate, largely because of these standards issues," said Leonard Kleinrock, professor of computer science at UCLA.

Arpanet in 1969. He conceded, however, that "it will get overloaded when we get much more multimedia."

Multimedia may well be the fork in the road, down the road. Nonetheless, when Dar Busa, vice president of marketing at Dallas-based Sterling Software, Inc., hears about the imminent takeover of cutting-edge, bandwidth-hungry, Internet-related products and technologies, he doesn't buy it. "That's the stock market talking — not the bottom line

parallel 'Internet,' specifically built and geared toward business communications and electronic commerce," she said. "Even though the Internet is considered this new, sexy thing, what it really is is your grandma. You're not going to take her to the prom."

Sounds like quite an undertaking, but Heckart

THE INTERNET "will get overloaded when we get much more multimedia."

LEONARD KLEINROCK, PROFESSOR, COMPUTER SCIENCE, UCLA, PICTURED NEXT TO THE SWITCH THAT LAUNCHED THE INTERNET
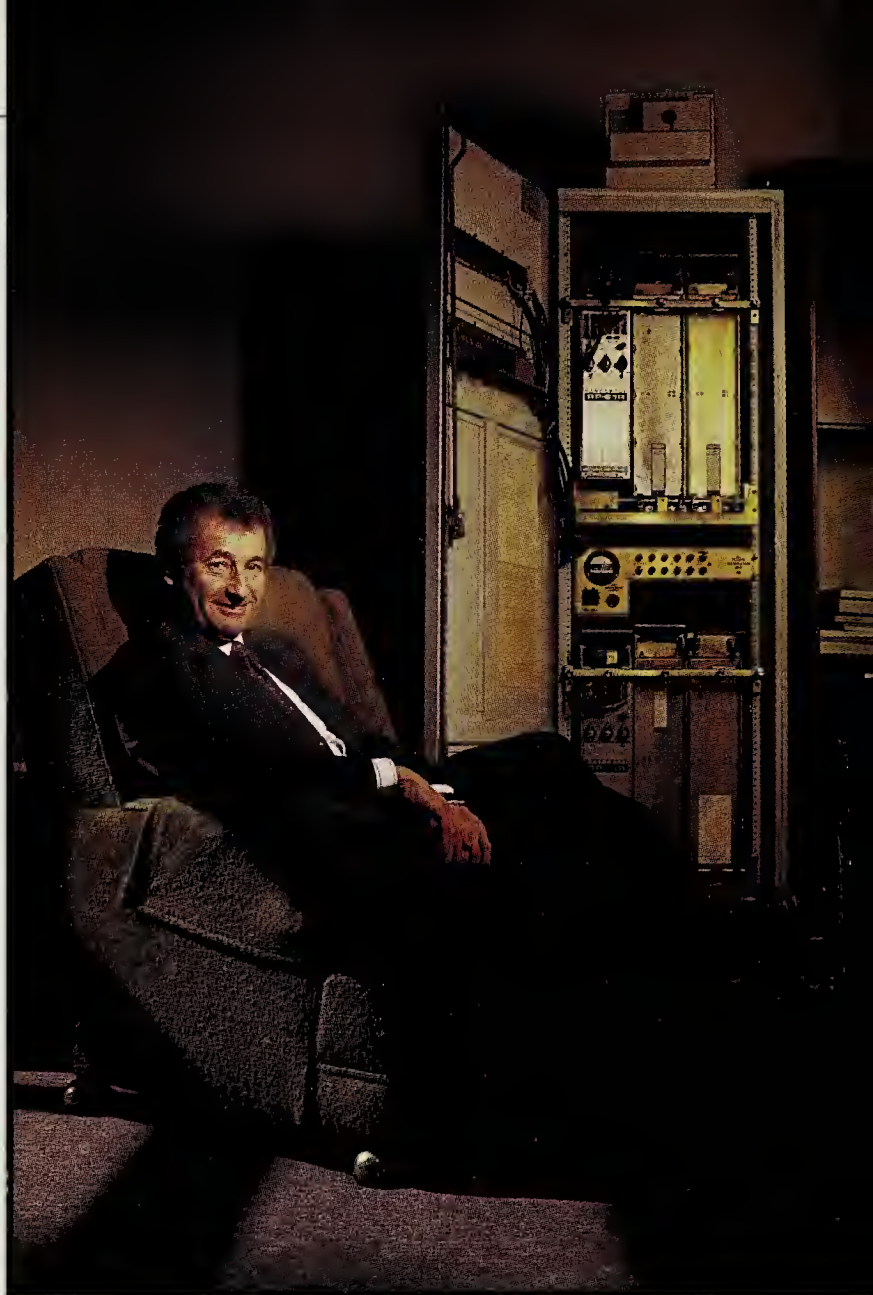
talking," he said.

The better question is who has any current, feasible, profitable business reason for wanting to put multimedia on the Internet. No doubt there are consumer-oriented applications that will benefit. But getting antsy about the lack of megabandwidth on the Internet in 1996 would be like itching in 1936 to start selling propeller grease to automobile owners in anticipation of the just-around-the-corner day when cars would fly.

Take the findings from a recent International Data Corp. report, which revealed that 63.5% of all Internet users are accessing it via lowly 14.4K bit/sec. modems. Fewer than 15% use 28.8K bit/sec. modems, and a mere 1.4% use Integrated Services Digital Network lines.

But just for a minute, let's pretend we're in a future that fulfills the rosiest predictions of today's electronic commerce proponents. Does the technological backbone look anything like the Internet?

TeleChoice's Heckart said it doesn't. "What we need is an industrial-strength,

asserted that it is doable in a couple of years. Who could pull this off? Either a high-end Internet access provider or a partnership such as AT&T Corp./BBN Planet or MCI/Microsoft Corp., she said.

Others disagree with the need for such a monumental rebuilding. First Virtual Holdings' Stefferud, for one, offers two solutions. The first would be to build special segments of the Internet with higher-performance parameters to meet, for example, a specific industry's need for reliability. The automobile industry, in fact, is in the process of doing this. Auto manufacturers are developing a plan to certify and monitor independent software providers for compliance with a set of performance, reliability and security metrics.

The basic idea, he said, is to lease lines between the critical sites and to restrict IP packet routing to approved IP addresses. In this way, "the auto industry can obtain controlled levels of service within their restricted traffic enclave, while still enjoying access to the rest of the 'net," Stefferud said.
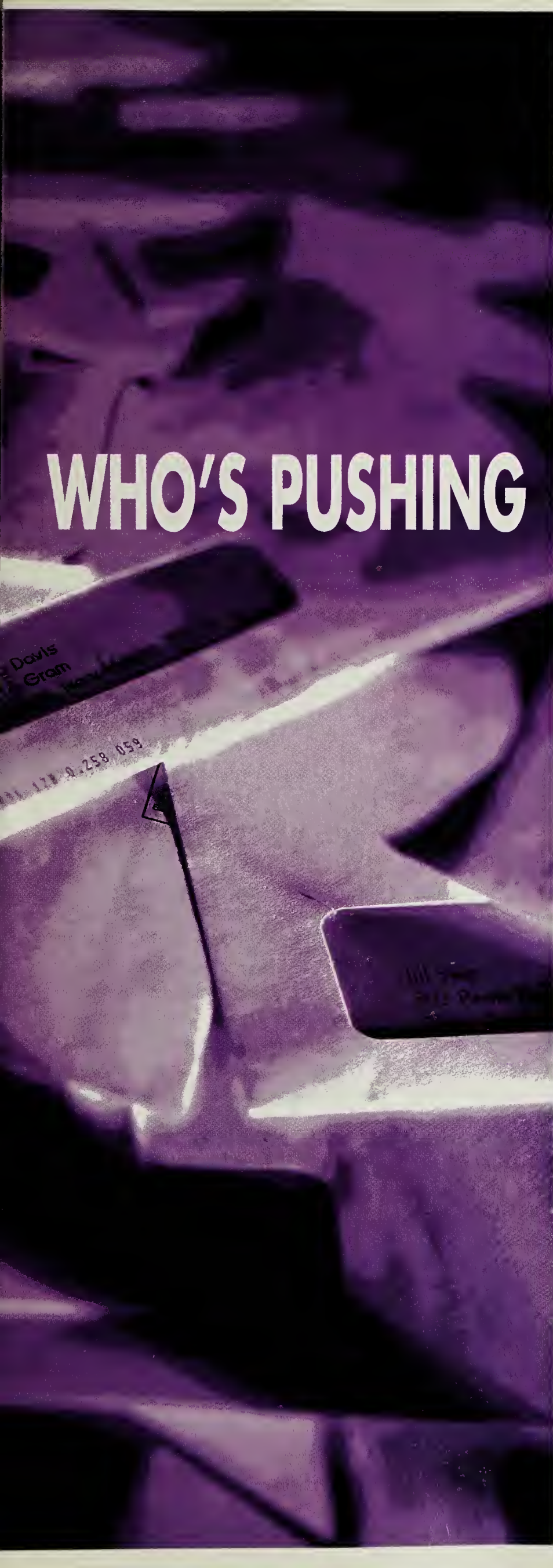
The second solution, he said, is to layer a well-designed protocol on top of the existing network to generate the desired level of dependability. Take, for instance, how his own company has designed its payment system to revert to mail in case of TCP/IP failures. The transactions will then accumulate in various mail queues around the Internet, ready to drain into the commerce server when the system is back in order.

Any company or industry can make any critical segment of the Internet as reliable as it wants, Stefferud said.

Time will tell, but we are well advised in the meantime to take all visionary schemes with a large grain of salt.

"I think the death of the Internet has been greatly exaggerated," said Lyle Ginsburg, manager of Arthur Andersen & Co.'s network technologies program. "You have to understand who's saying these things and what their vested interests are." ◀

Schlosberg is a freelance writer based in Cincinnati.

WHO'S PUSHING

UNLOCKING
the Database DOOR

GETTING BEYOND BROCHUREWARE

MEANS MAKING THE

WEB-TO-LEGACY LINK AND

BYPASSING HTTP LIMITATIONS

irtual Vineyards could see the problem coming from the get go. A year ago, when the Los Altos, Calif.-based on-line wine and food retailer started its Web site, it knew its customers would eventually have difficulty accessing the homegrown, Unix-based order processing system that enables transactions. And for a company that is nothing if not on-line, that would spell big trouble.

"We don't have a storefront, so we don't want people to come into our [Web] site and not be able to order," said Ruth Colombo, vice president of engineering. The problem, she said, was that shoppers had to reconnect to the database each time they moved to a different page containing wine lists, serving suggestions and food recipes.

Virtual Vineyards [www.virtualvin.com] is just one of the many Web pioneers running into a simple but com-

pelling problem with electronic commerce systems that depend on corporate databases front-ended by Web servers: The Hypertext Transfer Protocol (HTTP) that supports Web-to-legacy links treats this access as a onetime-only affair rather than as a session that could involve many requests.

Indeed, perhaps one of the biggest frustrations for Web users today, second only to bandwidth woes, is what Web watchers call the "stateless," or "session-less," nature of HTTP. This limits applications in a number of ways, one of which involves users waiting several seconds each time they click on a new Web page because each new page must make a new call to the corporate database.

"Every time a guy presses a button on a Web form, you have to go through the whole process of connectivity, and it's relatively time-consuming," said John Sauter, associate director at the Industrial Technology Institute's Center for

BY MARK HALPER

Electronic Commerce, an Ann Arbor, Mich., nonprofit consulting group. "It's only milliseconds, but milliseconds become seconds."

Or put another way, "You'd like to think that once you hit the home page and have gone three or four pages into it that you'd have a higher priority in terms of responsiveness than someone who just hit the Web page," said Eric Brown, senior analyst at Cambridge, Mass.-based Forrester Research, Inc. "But the Web has no way of knowing who is in the middle of doing something vs. who just walked in the door."

Just the same, companies ranging from start-up Virtual Vineyards to travel reservation giant Sabre Group are finding ways to build session-based systems to run applications such as order processing, inventory checking and ticket purchasing. After all, "most of the information that's critical to business today is in legacy systems, so Web sites offer a logical extension to interact with legacy data," said Tammy Lowe, assistant MIS director at Burlington Coat Factory [www.coat.com].

AMR Corp.'s Sabre Group travel reservation subsidiary [www.sabre. com/sabr_grp/sabr_grp.htm] well understands the real-world implications of sessionless sites. Sabre Decision Technologies, a unit of the Sabre Group in Fort Worth, Texas, is in the middle of an ambitious plan to tie the company's Web site into the IBM mainframes that support the massive, 30-year-old Sabre system. The planned system, dubbed "Travelocity," is one of the largest Web-to-legacy efforts under way and went live in early March after only nine months of development.

Web surfers can access the legacy Sabre system to book flights or view descriptions of travel destinations. But because Sabre is a "state-based," real-time system that delivers up-to-the-minute data throughout a session, "we've had to fool the Web site into thinking it's a state-based system," said Dolly Wagner-Wilkins, a principal at Sabre Decision.

Otherwise, "if I'm a user and I call up flights, and then I want to book one, the computer would have no idea who I am because the 'net can only handle one command at a time," said Doug Gray, a senior principal at Sabre Decision.

Plus, the user could end up booking a seat that has since become unavailable. That's because a further restriction on Web-to-legacy applications is the static nature of the Web, which makes it difficult to provide timely data or update information. "Today's Web is a dead Web," Forrester's Brown said.

So what's the trick? "Middleware," Gray said. A Silicon Graphics, Inc. (SGI) server acting as a middleware server and residing between the end user and the legacy system houses custom-built, object-oriented "screen builders" that create a real-time environment for the Web site. "We were hoping to employ third parties, but we haven't seen anything off the shelf," he noted.

WORKING OUT THE KINKS

Elsewhere, Web masters and electronic commerce staffers are taking advantage of new tools, databases, Web server software and homegrown programs to remove kinks in the Web-page-to-legacy link.

Many of the development tools are coming from third-party vendors such as Spider Technologies, Inc., Bluestone, Inc. and Edify Corp. The database vendors have also been adding features, such as Oracle Corp.'s WebSystem suite and Sybase, Inc.'s web.sql. Informix Corp.'s acquisition of Oakland, Calif.-based Illustra Information Technologies, Inc. provides Informix with tools for managing video, audio, text and graphics as well as traditional alphanumeric relational data.

Some of these solutions solve the Web's statelessness by tampering with the interface between a database application and the Web. Called the Common Gateway Interface (CGI), it is the Web equivalent of an application programming interface (API).

"CGI was a good mechanism for running simple programs on the Web server, like credit-card checks and simple searches," said Zack Rinat, chief executive officer at Palo Alto, Calif.-based Spider. Spider 1.5 circumvents CGI altogether when the Web server uses Netscape Communications Corp. soft-ware and reduces the CGI role on other Web server brands, Rinat claimed.

Vendors are also working to get around another Web limitation: There's no built-in way to track who's calling into the site and what the person does there. If the system could remember more, pages could be ready with customized information. For example, if a customer buys a color TV, the system could offer a VCR the next time the customer dials in.

With WebSystem, Oracle claims to closely watch shoppers. If, for instance, the customer is perusing a music site and drills down to the jazz section, the Web page can be tailored with jazz offers the next time the customer surfs in. Next Software, Inc. has redeployed its object development technology to help Web developers build customizable database links into their Web sites. And Connect, Inc. offers a high-end system that enables one-to-one marketing and customizable pages.

The travel industry is home to other Web-to-legacy projects. The Hotel Industry Switch Co. (Thisco), for instance, added a real-time booking capability to its TravelWeb system [www.travelweb. com/thisco/global/thisco.html] in December. Until then, TravelWeb was a marketing-only vehicle that delivered text and video information from a Sun Microsystems, Inc. SPARCserver 20 running Netscape Web server software.

To add the booking capability, Thisco had to tie its Web site into a four-processor Pyramid Technology Corp. Nile server sitting in Phoenix. That big Unix box acts as what Thisco calls an "ultra-switch": It routes hotel booking requests among 8,000 hotels and thousands of travel agents tied into large reservation systems such as Sabre.

How did Thisco make the connection from the Web server to the Pyramid box? Like Sabre, it constructed a single-*Please turn to next page*

processor Intel Corp. Pentium server running Unix and custom-built middleware that guarantees the real-time state of the data traded between agents and hotels, said Kathy Gutierrez, a product development director at Thisco.

About three quarters of the hotels in the Thisco orbit are hooked up in real time to Thisco's Pyramid switch. Anyone with Web access can use the system to make reservations.

At Virtual Vineyards, youthfulness abetted the effort to improve the Web-to-legacy connection. The 2-year-old firm's operations were small enough that it could replace its homegrown Unix database with a $15,000 Sybase database.

Virtual Vineyards chose Sybase because of the web.sql feature introduced in December. Web.sql includes Netscape APIs that invoke an ongoing "session" in the Web-to-database link and ensure that data loaded into a Web page is up to date, according to a Sybase spokeswoman. "Web.sql helps us maintain open connections," Colombo noted.

As of press time, Virtual Vineyards had not yet switched over to a production version of the Sybase system, which it was loading onto an SGI Indy workstation acting as the company's Web and database server.

To complete the link, Colombo had to rewrite existing code so that the Web site would tie into the new Sybase database. That rewrite — in the Perl language — is complete and took only two weeks, she claimed.

But a bigger rewrite may be in store as the firm evaluates other languages such as Sun's Java that have evolved since Virtual Vineyards first went online. Colombo said Java's popularity portends a greater selection of applications that Virtual Vineyards could tap.

She is expecting plenty of activity from all the database vendors working to facilitate Web site interaction. "A lot of the new ground seems to be in how we're accessing the databases," she said. And that clearly includes the Web.

Halper is a freelance writer based in San Francisco.

RETAILER PICKS PATTERN FOR WEB LINK

For Burlington Coat Factory, finding the right Web-to-legacy link has some immediate bearing on the company's internal work processes. And that, in turn, could eventually lead to full-fledged, Web-based electronic commerce with Burlington's customers and suppliers.

The Burlington, N.J.-based clothier has two internal operations already in place. The human resources department disseminates answers to frequently asked questions and posts its policy manual on-line. And the company has published a Web version of a portion of its electronic catalog, which is available to Web surfers both inside and outside the company. It is not yet set up for electronic purchasing.

IS director Tammy Lowe said she foresees an explosion of internal activity on the Web, but Burlington will first have to decide on a blueprint for making the link to the seven Sequent Computer Systems, Inc. Unix boxes that make up the company's legacy system in a symmetrical multiprocessing scheme.

Key to that link will be any development tool that cuts down on the amount of coding for each separate Web page, Lowe said. To that end, she lauded Oracle's PowerBrowser — part of Oracle's Web-System suite — which the company used to tie its catalog and human resources information to its Web sites.

According to Lowe, PowerBrowser actually includes Web page development tools that keep the Oracle browser in mind. Developers can construct a page so it receives real-time information and displays only the data germane to that page and suitable to the access privileges of each particular Web surfer.

That feature is key to any IS department developing database links to Web sites. "People aren't going to build mission-critical applications on the Web if they have to recode the mission-critical data for each page," Lowe said.

Lowe's point is a reminder that raw data may be impressive, but it's useless unless it is presented in the right manner to the right person at the right time. In other words, as Forrester Research senior analyst Eric Brown noted, having data is just part of the battle in strategically deploying a Web site. Easy access to and useful applications for the data really deliver a strategic edge.

"You want to use the Internet as an extension to your legacy systems," Brown said. "You have to keep in mind that you're not just deploying data — you're deploying applications."

BURLINGTON COAT'S TAMMY LOWE PREDICTS AN EXPLOSION OF INTERNAL WEB ACTIVITY — BUT ONLY AFTER MAKING A LEGACY LINK

WHAT'S THE ETA ON MAINSTREAM GLOBAL ELECTRONIC COMMERCE?

NORTEL
Northern Telecom

)
STERLING
COMMERCE

800-305-0315
614-791-6499
FAX 614-793-7221
http://www.stercomm.com

FEAR
AND LOATHING
on the World Wide Web

THERE ARE NO GUARANTEES ON THE 'NET — EXCEPT THE ONES YOU BUILD YOURSELF USING ENCRYPTION AND AUTHENTICATION STANDARDS

A h, security. Just when you thought you had the hang of it, someone got the bright idea of conducting commerce over the Internet. Life as you know it will never be the same.

But not for the obvious reasons. Not because of the hackers poised to pounce on your vulnerable transmissions. That kind of threat has been here for years.

No, what's different is this: Instead of concentrating on keeping strangers out, today's security professionals must learn to invite them in — to bid on contracts, view product literature, even conduct financial transactions. As a result, most of your assumptions, skills and decisions regarding security must be tossed into the dustbin of history.

"Never before have companies had the prospect of 30 million tire kickers invited into their core application com-

plex," said Blane Erwin, senior analyst at Forrester Research, Inc.'s Network Strategy Service. "And it makes security a different kind of job because IS now has to think seriously about the information it has, how much it will make accessible and to whom."

These are tough issues, especially in an environment whose underlying technology allows people to pretend to be someone else, intercept data and passwords and change that information before it reaches its destination. Hardly the attributes to promote commerce. And yet the Internet is increasingly eyed as a communications medium for doing business among suppliers, vendors, consumers and merchants.

Sound like a pipe dream? "Currently, I can't think of anything more dangerous than passing valuable commercial information over the Internet," said Jon Littman, author of *The Fugitive Game*

BY ROCHELLE GARNER

(Little, Brown and Co., 1996), a book that details the capture of famed hacker Kevin Mitnick. "I know a merely average hacker who cracked a banking money-transfer system and transferred thousands of dollars for himself. And there are plenty of hackers out there who are more talented than he is."

Undoubtedly true. And yet, many experts say, companies can safely transmit critical business information over the world's interlocking public networks, provided they take the right approach. The first step? Adopt the proper perspective. "Security is important, but not as important as companies think," Erwin said. "The right question is, why hold the Internet to a higher standard?"

His point is this: Commercial transactions in the real world have higher incidents of fraud than most people realize. According to Erwin, the cell phone industry suffers $20 in fraud for every $1,000 spent; credit-card companies get taken for $1.40 per $1,000. "There's the expectation that fraud over the Internet can be zero, and that's wrong," he said.

WHOM DO YOU TRUST?

It's quandary time. But the fact is, both views are correct, as long as organizations remember that on the 'net, there are no built-in guarantees that information actually came from the alleged sender or that it wasn't altered along the way. The issue: finding Internet equivalents to the passports, driver's licenses and official signatures that exist in the three-dimensional world.

"This is where the IT organization of the future comes in," said Joe Carter, managing partner of Andersen Consulting's Center for Strategic Technology in Palo Alto, Calif. "IS has to have an infrastructure that allows them to authenticate and authorize users from outside their organization. They have to have a new 'knowledge manager' who understands the value of their knowledge assets and decides what should and should not be made available. And they have to change their thinking, from barricading information to opening it up."

We have the technology. "If you are transmitting something that has val-

ue, you have to use cryptography," said Larry Landweber, professor of computer science at the University of Wisconsin in Madison and president of the Washington-based Internet Society. Cryptography, most agree, is essential for authenticating users, protecting confidentiality and ensuring integrity. From it comes encryption, decryption, digital signatures and digital identifications.

First, a brief primer: Today, most cryptographic systems use a public key scheme popularized by RSA Data Security, Inc. in Redwood City, Calif. Keys range from 40 bits in length on up.

The beauty of a public key system is logistics. They can literally be broadcast, with companies in effect saying, "If you want to contact us, use this key." Each public key has a corresponding private key known only to its owner.

Until recently, though, even public key encryption proved burdensome, requiring additional software and forcing people to go out of their way to use it. Last year, with the formation of Terisa Systems, that began to change. Terisa licenses RSA encryption to any company that wants to produce a secure Web server. The result? "Security is becoming productized," Erwin said. "And that makes it … just a matter of putting the right products together."

NOT SO FAST

If only it were so easy. "Security built-in is contradictory to transparent, at least in terms of administration," said Ken Shaurette, information security specialist at American Family Mutual Insurance Co. in Madison, Wis. "There's no standardization in these products, so as a security administrator I could have 10, 15, 20 different systems to learn."

Those concerns have American Family keeping the Internet at arm's length, using it only to advertise services. "There's nothing to say that, as security improves, we won't take advantage of the Internet for electronic commerce,"

Shaurette said. "But right now, we reserve that for our private lines."

He's right to be cautious, considering the still-amorphous state of Internet security standards. Start with the encryption used in Netscape Communications Corp.'s Netscape, the most popular commercial Web browser. Within the U.S., Netscape's encryption algorithm is 128 bits long. Outside U.S. boundaries, thanks to federal government export controls, the algorithm is a mere 40 bits. That's the cryptographic equivalent of the 98-pound weakling. Now imagine keeping the two versions straight.

Then there's the kind of security that browsers and servers use. Netscape uses the secure sockets layer (SSL), which provides security at the connection level. SSL's competitor is Secure Hypertext Transport Protocol (SHTTP) from Terisa. It provides message-level security. Neither is considered more secure than the other, although SSL is becoming more of a de facto standard. Still, for either scheme to work, it must be on both the Web server and browser software.

Confused? There's more, because also in the mix of proposed security standards is a raft of standards aimed at different functions. These include nonrepudiation protocols, payment protocols and electronic-mail protocols.

Consider nonrepudiation, which guarantees a message's sender and its integrity. It is handled in part by SHTTP but not at all by Netscape's SSL.

Then there are the nearly 20 different payment protocols now under discussion. That's confusing enough. But throw in different payment instruments, such as those from CyberCash, Inc. and DigiCash, and it's clear that payment remains a nebulous issue.

This confusing array of security standards poses a difficult scenario: Every organization that needs to exchange

sensitive information would have to use identical security standards.

What's more, to truly understand how to secure Internet transmissions, you have to know the technology's vulnerabilities. That's why John Rhodes relies on E-mail to secure payment orders between Lawrence Livermore National Laboratory in Livermore, Calif., and Bank of America in San Francisco. The two are running a pilot payment system, sponsored by CommerceNet.

Several times a day, Lawrence Livermore automatically downloads accounts payable messages to its electronic data interchange (EDI) system, converts the message to the standard X12 format, encrypts it, signs the message with the lab's private key, puts the whole thing in an E-mail envelope and sends it to the bank. "E-mail security is among the best available for the Internet," said Rhodes, electronic commerce/EDI projects engineer at the lab.

Of course, it helps that Rhodes and his colleagues truly understand the nitty-gritty of E-mail transmissions. And that's critical. "It doesn't take too big a mistake to leave yourself wide open," he said.

HIGHER AUTHORITY

Today, the full promise of global electronic commerce remains unrealized because there's no universal way to verify identity. That could begin to change in about a year, with what's being called a public key infrastructure. Its purpose is to issue the electronic equivalent of passports in the form of public keys, digital signatures and other cryptographic identities that prove we are who we say we are. RSA spin-off VeriSign, Inc. in Belmont, Calif., is among the first to offer this service, with its digital identifications — the key component for secure Web servers.

But for interoperable security to be truly ubiquitous, some say electronic commerce will also need the presence of a large, pervasive authority. "If I have a public key that was issued by someone who isn't reliable, what good is the key?" said Jerry L. Johnson, senior policy analyst for the state of Texas Department of Information Resources in Austin. So who will that higher authority be? "Right now, the U.S. Postal Service seems the most likely candidate in this country," he said.

Perhaps surprisingly, most experts predict that the public key infrastructure will be in place by the end of next year. When it is, companies face at least the prospect of ubiquitous and global electronic commerce over the 'net. For now, companies that are eyeing the Internet must create small, self-contained communities of trusted partners.

In the meantime, nearly everyone involved in furthering business over the 'net has the same advice: Start small, get acquainted with the technology, and gradually build up a system of electronic commerce. But by all means, start.

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GETTING SECURITY SQUARED AWAY

The 'net doesn't scare Ken Urquhart. Just look at his handiwork for Alaska Airlines in Seattle: a Web site that takes credit-card numbers and sells airline tickets without fear of being hacked.

"You don't have to be as fearful as you think or hire a team of security experts to protect credit-card transactions," said Urquhart, a research scientist at the airline in charge of creating the first Web-based ticketing system in this country. "You just have to be careful about the hardware and software you choose."

Case in point: "We made the choice to go with the Apple Internet Server, which has been handling up to 100,000 hits a day without a problem," he said. Why the Macintosh? Because it isn't Unix, Urquhart said. "The Mac OS has a very specific and limited means of Internet access, without all the backdoors you find in Unix."

Important for Alaska's system are the components and policies that make transactions secure. Because the No. 1 Web browser is Netscape, for example, Alaska uses the SSL security protocols in its server software. So users who access the Web page through Mosaic can still make reservations but must call a travel agent to buy tickets.

The key to Alaska's system is its digital ID from VeriSign, Inc. "You can buy secure software, but it won't run secure without a digital ID," Urquhart said. "It's the ingredient for making it all work."

The result: "We control the credit-card transaction a lot tighter than does someone handling paper," said Bob Reeder, staff vice president of information and communication services at Alaska. "I think the Internet environment can be more secure than in the 3-D world."
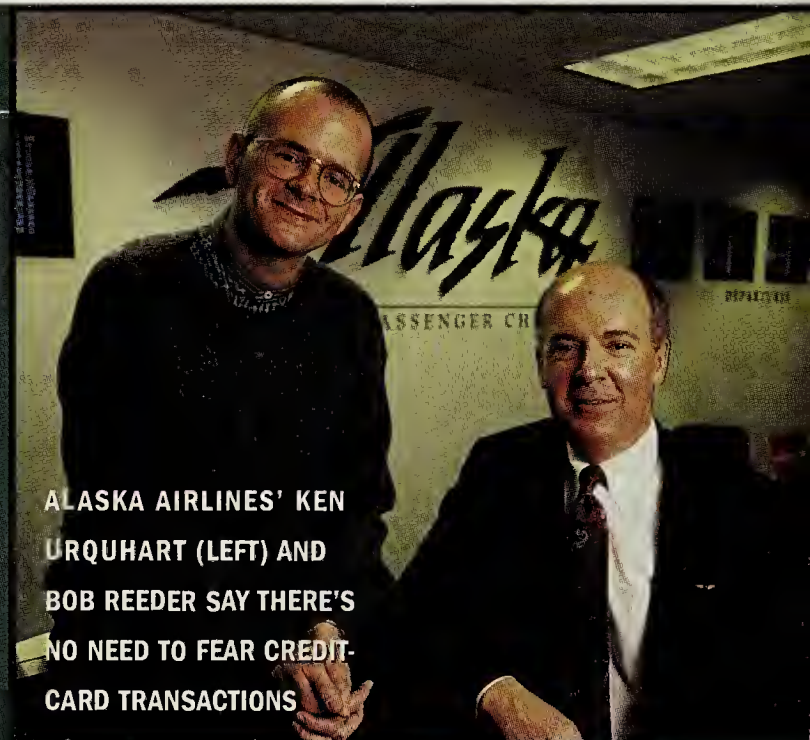
ALASKA AIRLINES' KEN URQUHART (LEFT) AND BOB REEDER SAY THERE'S NO NEED TO FEAR CREDIT-CARD TRANSACTIONS

Still, the airline did face one hurdle that shows electronic commerce going beyond mere technology. "At first, our banking partners were extremely concerned, threatening to refuse any credit-card transactions that came over the 'net," Reeder said. "But once we explained how and what we were doing, they had no objections. It's just a matter of taking the proper precautions."

HOW
CAN I GET
THE GREATEST
RETURN

FROM
FINANCIAL
ELECTRONIC
COMMERCE?

JUST ASK US. By working with Sterling Commerce, ABN-AMRO, one of the world's Top 20 banking companies, is making the most of its investment in electronic commerce. After a successful financial EDI pilot for its corporate cash management customers, the company decided to expand its electronic commerce program to include accounts payable applications. With Sterling Commerce as a partner, the bank streamlined its own accounts payable department by enabling the group to receive, format and pay the company's incoming invoices electronically.

ABN-AMRO's reengineering project has paid off in increased efficiency and accuracy. With Sterling Commerce's help, the institution is now planning to offer its accounts payable services to other corporate customers. As ABN-AMRO discovered, when it comes to contributing to the bottom line, Sterling Commerce is the company you can bank on.
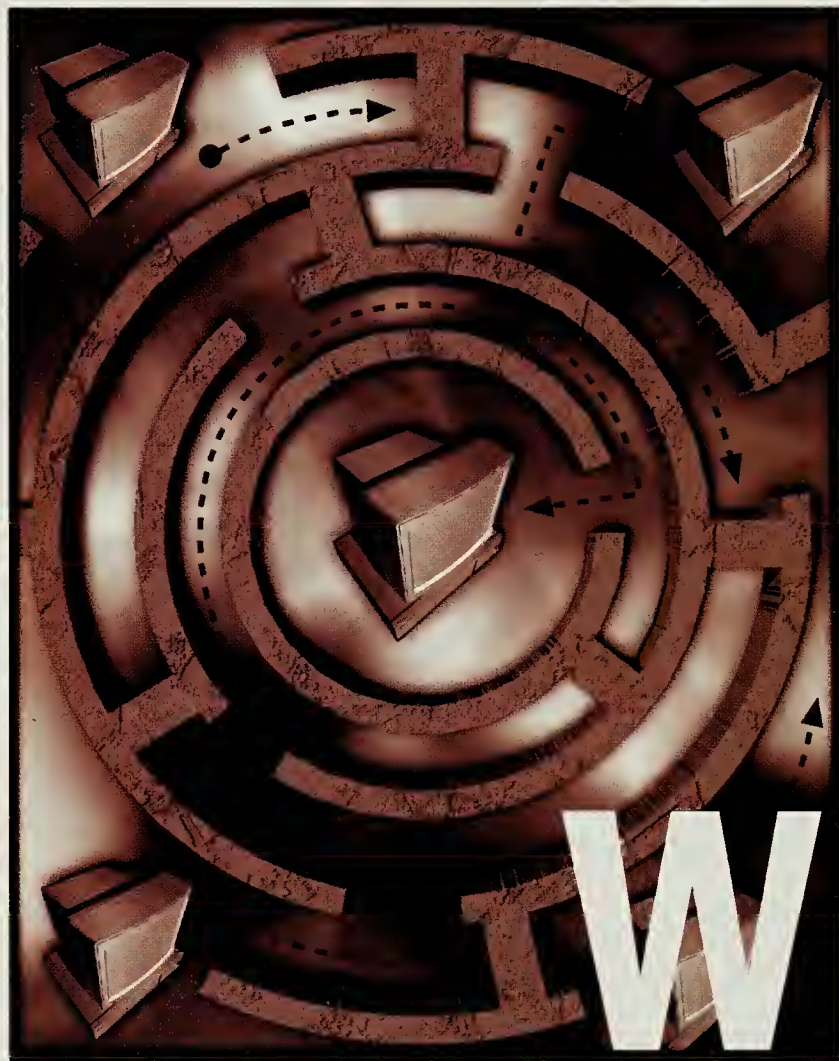
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STARTING A WEB BUSINESS?

PUT AWAY THAT HTML MANUAL

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THE REAL WORK HAS JUST BEGUN.

BY ALICE LAPLANTE

hen Schoolkids Records and Tapes, Inc., an Ann Arbor, Mich.-based record store and recording label, established its Web page in 1994, President Steve Bergman made an effort to keep things modest. "We had no interest in replacing our retail store with an electronic company," he said. So while visitors can browse through musical releases, download sound bytes of new recordings or "chat" with knowledgeable employees, if they want to buy a CD or tape, they are urged to call an 800 number.

But modest? Bergman soon found out otherwise. "As it turned out, we were way too ambitious," he admitted. The biggest challenge, he said: site maintenance. And he isn't talking technical issues.

First there was the job of generating enough high-quality content. Then, Bergman had to make sure electronic questions got answered in a timely manner. Even after hiring a new employee to manage the site, Bergman realized his staff of 30 would have to become professional jugglers to balance Schoolkids' $3 million business with the new activities the Web generated. "The more we did, the more the site seemed to require," he said.

So you're thinking about leaping into the electronic marketplace? While technical challenges abound, your biggest headaches are likely to be organizational: how to define what new jobs are required (see box page 33); how to hire or retrain employees to fill those jobs; and how to restructure your company and redefine departmental roles and relationships.

Whether you're building a Web site or planning a business-to-business purchasing system, "expect to see the effect of an on-line application ripple through your entire organization," said Jim Proctor, president of The Inteq Group, a Los Angeles-based consulting firm that specializes in electronic commerce.

Proctor recently completed an on-line order processing system for a client. The effect on the firm was "dramatic,"

Need more information about EC?

he said. Field sales representatives, freed from manual order-taking, spent more time on higher-level marketing and "relationship management"; low-level order-entry and credit-approval clerks were no longer necessary; and fewer telephone reps were needed.

In general, an on-line system will "require higher-level people, and less of them," Proctor said.

Further confusing the matter is the uncertainty of Web-based electronic commerce. According to International Data Corp., 20% of Fortune 500 companies with Web sites will have stabilized or closed them by year's end. The reason: Users will be "underwhelmed" by content and capabilities. That makes it difficult to predict staffing requirements, especially because most sites are informational and unlikely to generate significant revenue in the near future.

And so some firms are reticent to rock the boat. Silicon Graphics, Inc. (SGI) in Mountain View, Calif., one of the first commercial entities to establish a Web presence, is holding off on selling its products on-line. Such a venture would wreak chaos on SGI's worldwide network of 65 sales offices and 30-plus distributors. "When you have multiple channels of distribution, you need to be sensitive about competing with your partners," said Anita Schiller, director of electronic marketing.

Then there's the question of where, organizationally, your electronic commerce employees fit in.

After much discussion, the electronic marketing commerce services group at Hewlett-Packard Co. was situated in the worldwide marketing department. "Ultimately, we decided the site probably has to be owned by marketing because it involves the way the company interfaces with the customer," said Randall Whiting, whose background includes sales, marketing and software development.

On the other hand, it doesn't make sense for marketing to become a buffer between employees and customers.

"Larger companies, especially those with multiple divisions, have to make sure that customers can connect directly with the right person without getting mired in a lot of organizational layers.

After all, that's one of the chief advantages of doing business on-line," said Cathy Medich, executive director at CommerceNet, a Menlo Park, Calif.-based consortium of Internet-based businesses.

Which leads to the issue of accountability. With this new way for customers and suppliers to interact with the organization, how do you make sure nothing falls between the cracks? "If a customer wants to place an order electronically, communicate through E-mail or get support on-line, that's great. But if they want the human touch, that has to be there as well," Whiting said.

To ensure the highest quality response to electronic customers, The Vanguard Group, Inc. established a dedicated group to handle the more than 500 queries a day it gets from various on-line connections. "We knew that electronic client services is quite different from telephone service. It requires a higher level of research ability as well as the skill to craft a well-written response," said Bob DiStefano, senior vice president of information technology at the Valley Forge, Pa., financial services firm.

And "because the Web will allow employees to work more directly with customers, companies need to be aware that Web interactions will call for somewhat different skills," said Glover Ferguson, director of research at the Center for Strategic Technology Research at Andersen Consulting in Chicago. Chief among these are writing skills. In addition to misspellings and grammatical mistakes, which give a poor impression, "you can't take back the things you 'say' on-line," he said.

Many of the skill sets for a successful electronic business are still being defined. A case in point: The first employee hired at Virtual Vineyards, a Los Altos, Calif.-based Web site that sells wine, olive oil and other gourmet foods, was a wine guru. The second: an electronic marketing manager. What does that job entail? Robert Olson, president of Virtual Vineyards, admitted he's still trying to figure that out. "Our marketing manager is basically responsible for getting the customer into our electronic store — whatever that takes," Olson said. "It's a tough job because no one quite knows how to do it yet." ◆

LaPlante is a freelance writer based in Woodside, Calif.

MOVE OVER, WEBMASTER

The following responsibilities used to be grouped under the title of "Webmaster." But as a Web site becomes more active, it needs more than one person to keep it going. Here are some new job titles appearing at firms with emerging Web businesses:

CONTENT DEVELOPER. Provides the raw material that makes your site worth visiting.

CONTENT EDITOR. Makes sure this material is accurate, current, unduplicated and positioned correctly within the site.

COPY EDITOR. Keeps content clean of spelling and grammatical errors and ensures consistency with corporate culture and image.

INTERFACE DESIGNER/MANAGER. Ensures that the Web site is easy to navigate.

ELECTRONIC MARKETING MANAGER. Gets customers in the door of the site. Establishes "hot links" — i.e., buying, selling or trading with other sites to increase traffic.

WEB EVANGELIST. Surfs the Web to check out competi-tion, raise awareness, keep on top of new ideas.

WEB SUPPORT MANAGER. Makes sure visitors can navigate through the site. Answers user questions. Provides feedback to Interface Designer/Manager.

QUALITY CONTROL MANAGER. Ensures that interactions with customers meet corporate standards. Polices departmental accountability for returning E-mail, answering queries.

NET WIZARD. Knows the "next hot thing" about Web technology.

DON'T TRY THIS @HOME

IF THE WORLD WIDE WEB represents the cutting edge of electronic commerce, EDI is its cornerstone. Developed by the trucking industry nearly 30 years ago, this very rigorous, complex and relatively expensive way of doing business electronically — such as exchanging quotes, purchase orders, invoices and shipping notices — has crept its way into most of the Fortune 1,000.

Still, the estimated 100,000 U.S. companies conducting electronic data interchange (EDI) represents just a small fraction of the 6 million businesses in existence today.

Can the Internet change those mathematics? With its promise of lower costs and easy accessibility, a lot of people, including EDI vendors, are starting to think so. For small and medium-size firms, formal EDI over value-added networks or private lines is just too expensive and complicated; the Internet seems to put EDI within reach.

And quickly. Within five years, most EDI will transact over the Internet, predicted Jack Shaw, president of Electronic Commerce Strategies, Inc. in Marietta, Ga.

Even stalwart EDI users are opening their imaginations. In a recent survey by Forrester Research, Inc. in Cambridge, Mass., 20 of 30 heavy EDI users said they are looking seriously at the Internet.

Take Texas Instruments, Inc. Its EDI system conducts 600 transactions a day. So why is the Internet even a twinkle in the company's transaction processing eye? Two words: cost and collaboration.

TI currently pays several hundred thousand dollars a year to more than 40 value-added network (VAN) providers that not only provide the connection and mailbox but also manage EDI messages to ensure they arrive safe and sound.

And while EDI is great for formal transactions, it does nothing for ad hoc

TI'S GENE PHIFER AND ALAN KRAVITZ see hurdles to overcome before implementing EDI over the Internet

exchanges. If TI could add file transfers, videoconferencing and whiteboarding to its roster of supplier interactions, it could cement relationships and add significant savings in the supply chain, said Gene Phifer, senior information technology manager and Internet strategist.

Wouldn't it be great, he speculated, if the firm could use the same backbone for both collaborative activities and EDI?

EDI vendors are well aware of such speculation. That's why they're scurrying to set up new Internet businesses and offer products and services designed to make the Internet secure

THE INTERNET IS A WILD AND WOOLLY PLACE FOR EDI. NOT FOREVER, THOUGH — EVEN STALWART PLAYERS SEE THE 'NET IN THEIR FUTURE.

(see story page 36). Eventually, the EDI VANs are expected to unbundle their translation, mailbox and other management services from their network connectivity charges and make them available on the Internet, said Marty Tenenbaum, founder of CommerceNet, a consortium that promotes Internet commerce.

"After years of working with fairly rigid systems, [EDI users] are willing to dream, but they're looking at their transactions going off into the wild and woolly Internet," said Blane Erwin, an analyst at Forrester. That's where the VANs can step in: "As transaction brokers, they can take on authentication and accountability and help big companies weld the old EDI to the new, sleeker world of the Internet," he said.

At least in terms of basic transmission costs, the economics are sound: With the Internet, you typically pay a flat fee or sliding rate to your Internet provider or piggyback on your company's existing Internet connection.

BY TONY BAER

On the other hand, dedicated links to individual trading partners can cost thousands of dollars. VANs aren't much cheaper. Most charge by EDI transaction length. A typical purchase order costs up to a quarter — roughly the price of a 60-second interstate call. Although volume users can negotiate more favorable terms, costs still mount.

But wait, there's more. Future Internet/EDI offerings may simplify EDI for smaller players so that anyone with a Web browser and an Internet connection can play, Erwin said.

Dan Ferguson, head of the EDI Group Ltd. in Oak Park, Ill., offered one example of how this might work. A company would simply log on to a Web home page and fill out an on-line form. That would invoke a script on the Web server to automatically translate the data into an EDI format that would then be fed into an invoicing or purchase order system.

The VANs are already starting to offer such capabilities. Premenos Corp. is expected to announce products in the first half of this year that fall under its WebEDI umbrella.

Theoretically, Internet/EDI transactions would be much closer to real time. With traditional store-and-forward EDI, delivery time is 12 to 24 hours vs. minutes on the Internet. Electronic Commerce Strategies' Shaw describes one scenario where this would be especially useful: Automotive suppliers whose plants are located so close to their Big Three customers that their trucks often arrive at the loading dock before their advanced shipping notice EDI transactions do.

But there's a good reason why VANs are called "value-added" networks, said Alan Kravitz, who manages TI's EDI processes. "If you're going to do EDI over the Internet, you'd better know what you're doing" because you or your EDI provider will have to rebuild all the

VENDORS VIE FOR INTERNET EDI

The prevailing Internet mantra for EDI VAN and software providers has become, "If you can't beat 'em, join 'em." A sampling of strategies is listed below:

GE INFORMATION SERVICES launched InterBusinessSM, its security software for Internet transactions. GEIS also offers 'net access to its VAN using a standard Web browser, and its EDI services will be gradually unbundled [www.geis.com].

HARBINGER CORP.'s TrustedLink INP includes a Web site builder, a browser, Internet access and Web site hosting. TrustedLink Guardian, due this summer, is messaging software that will work with Harbinger's EDI management software to enable trading partners to send EDI transactions via the Internet [www.harbinger.com].

IBM ADVANTIS plans to offer EDI services over the Internet that support Web, FTP and SMTP services as well as gateways to additional EDI services [www.ibm.com/globalnetwork/].

PREMENOS CORP. was first with an Internet security product called Templar, which incorporates DES and RSA Data public/private key encryption. This summer, Premenos promises to provide more information on products under its WebEDI strategy, which is intended to EDI-enable anyone with Internet access and a Web browser [www.premenos.com].

STERLING COMMERCE, INC. is expanding the functionality of its Gentran: Server translation software by incorporating Internet firewall and encryption capabilities. Sterling also offers an Internet gateway to its Commerce: Connection network to let customers transmit documents via Commerce: Network [www.sterling.com].

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necessary checks and procedures, he warned.

Particularly security. "For smaller enterprises, your VAN might cost $300 a megabyte. But if Internet costs $10 per megabyte, plus an additional $20,000 to build the firewall, what's your real cost?" said Randy VandenBrink, EDI services manager at Hewlett-Packard Co., which plans to get its feet wet with Internet/EDI within the next year or two.

Plus, the Internet is a public network. What assurance do you have that your transaction won't get switched into some weird place or end up in the wrong hands?

But security is not a showstopper for everyone. At Avex Electronics, Inc. in Huntsville, Ala., the goal is to piggyback on parent company J. M. Huber Corp.'s existing T1 Internet links. Using Premenos' Templar Internet security product, Avex is now conducting an Internet/EDI pilot with one partner and hopes to transition the rest of its 80 trading partners within two years, saving about $15,000 annually.

"We don't think that any solution will be 100% secure, but we think that the solution will be good enough to outweigh the risks," said Mike Gordon, manager of electronic commerce.

WHERE THERE'S SMOKE ...

So while Internet/EDI may be dark and dangerous, several firms, including a few financial institutions, are now conducting pilots or implementing production systems. But cost is not the only incentive: Bank of America in San Francisco is hoping to increase bill-payment services among small and midsize businesses. And Bank One in Columbus, Ohio, is opening a new business, processing subscription payments for a specialized library periodical service.

Bank of America's project involves a six-month pilot with Lawrence Livermore National Laboratory in Livermore, Calif. (see story page 28). Security measures are based on Bank of America's implementation of RSA Data Security, Inc. and data encryption standards. So far, said Bill Jetter, vice president of Bank of America's Global Payments

business unit, no security breaches have been recorded, and most transactions are completed within six minutes. Much of that time is accounted for by negotiating Bank of America's elaborate security procedures.

Of course, the pilot is being conducted with two local trading partners. Jetter conceded that bandwidth and turnaround might be issues if the process were implemented on a larger scale with more widely scattered customers.

Bank One's project involved building what product manager Steve Dieringer termed "a private VAN on the Internet." Along with two partners — an on-line catalog provider and Open Market, Inc., a Cambridge, Mass., developer of Internet transaction-processing software — the bank has been processing subscriptions since last September. However, only order-entry and order-acknowledgment transactions are transmitted — nothing financial.

OPEN VISION

Some believe that the next logical step will be "unsolicited EDI" and that the Internet will be the perfect place for it. The idea of unsolicited EDI, also known as "open EDI," is for any two companies to conduct EDI like two ships passing in the night, said Jeff LeRose, head of EDI consultancy Research Triangle Consultants.

Not everyone buys into that vision, however. Internet/EDI may change the way EDI is processed, but it doesn't mean you'll necessarily start doing business with complete strangers, said Victor Wheatman, a vice president at Gartner Group, Inc. "You'll still need to establish trust and validate data structures before you open a trading relationship," he said.

In fact, the new forms of EDI are really nothing more than new technology, HP's VandenBrink said. The hard part is still changing business processes to do more business electronically. As with traditional EDI, he said, "the significant effort will be how to fit it into your business environment."

Baer is a freelance writer based in Bedford, Mass.

Why people move to Electronic Commerce varies as much as businesses vary today. For example: A regional grocery store chain no longer carries its own inventory. Instead of purchasing products to put on its shelves, it now "rents" the shelf space to its suppliers, managing the product flow through an electronic just-in-time delivery system linked to its check-out scanners.

A bank adds fee revenues by providing electronic corporate payment services via the Internet to its local merchants and major corporate clients, such as utilities, government agencies and home services businesses, slashing accounts payable/receivable costs for enterprises that deal with thousands or millions of consumer and corporate paper checks each day.

A major PC manufacturer streamlines its supply chain management system by putting all its trading partners, including small suppliers, on-line. Costly paperwork is eliminated; inventory handling charges are slashed; and ordering, manufacturing and shipping processes can be fully automated.

Re-Engineering the Enterprise
In this day and age when we hear so much about "re-engineering the corporation," electronic commerce technology truly promises to change the way that companies of all sizes work. New business processes—from supply chain management to just-in-time manufacturing/delivery and WWW Commerce—are now possible as EC features are being adopted not just within a company but by its small to very large trading partners as well.

At its most basic definition, electronic commerce is the process of doing business electronically. It involves the automation of a variety of business-to-business transactions through reliable and secure connections. Depending on the need, EC involves different technologies and value-added services such as electronic data interchange (EDI), e-mail, electronic funds transfer, electronic forms, file transfer, interoperable database access, messaging, bulletin boards, catalogs and security devices (firewalls, encryption, gateway managers, etc.). Whether standards-based EDI exchanges of purchase orders and shipping notices or Web-based catalogs are used, EC requires a great deal of automation—both at the production application-to-application level as well as the end-user productivity level.

By reducing the clerical workload and eliminating unnecessary paper handling, electronic commerce can ensure rapid, accurate, secure exchange of time sensitive business information; reduce operating and inventory costs; and improve the speed of ordering, delivering and paying for goods and services. Companies can now implement key strategies such as quick response, EC data warehousing, just-in-time manufacturing/delivery, vendor-managed inventory, supply chain management, and Internet marketing programs. These competitive advantages account for the 25-35% annual growth rate for the electronic commerce industry.

Many companies dabble in EC or provide just one technology, such as EDI software, that addresses a small portion of the EC business needs. Sterling Commerce is the only company currently providing a comprehensive suite of robust software and value-added services that enables the expanding role of electronic commerce in business and government.

Sterling has provided EC and EDI solutions for more than 20 years, and counts among its 17,000 customers 96 of the 100 largest U.S. industrial companies (as ranked by *Fortune* Magazine) and 99 of the top 100 U.S. commercial banks (as ranked by deposits by *American Banker*). Since Sterling Commerce already provides more than 70 software and service products, it is widely regarded as the global leader in EC. It offers a virtual "one-stop shop" for: financial EDI and electronic payment software; network access and value-added EC services; EC translation, mapping and messaging software; and advanced information networking infrastructure capabilities, such as file transfer, database/application integration, and security management software.

Moving Beyond Four Walls
Electronic commerce has spawned the need to manage an "extended enterprise" operation, one that not only includes a firm's various divisions, sites and offices, but also involves close partnering relationships with customers, suppliers, banks and other trading partners. According to Warner Blow, President of Sterling Commerce, the key to successful EC is business operations first, technology second.

"EC is many things," Blow says. "It's EDI. And it's the Internet plus supply chain management. One of these things alone is very important, but none of these alone encompasses the breadth of Electronic Commerce. Each is individually important, and if you put them together—combining operational needs with the various applications, databases, networks and hardware platforms needed to affect bottom line objectives—that's when you have EC."

Sterling counts among its 17,000 customers 99 out of the top 100 U.S. commercial banks.

Sterling has been a pioneer in electronic commerce over the Internet, automated supply chain management, financial EDI and information networking, Blow adds. To continue to be the leader in EC, Sterling Commerce has organized its operations around today's four major EC solution areas—Banking Systems and the VECTOR software family; Communications Software through the CONNECT product family; Interchange Software, which distributes the GENTRAN product family; and Network Services through the COMMERCE suite of software and services.

Electronic Commerce Niches

Although VECTOR is a check-processing staple for thousands of U.S. banks' back room item processing operations, it is also the dominant front-line software for financial EDI (or FEDI). FEDI is in its infancy, but is expected to grow dramatically over the next three years as more corporations demand that their banks support integrated electronic payments. Within the payment arena, Sterling Commerce plans to be at the forefront of this move as well as other emerging technologies, such as the use of the Internet for corporate payments.

Much of today's electronic commerce challenge is based on providing an extended enterprise communications infrastructure. For Sterling Commerce, this is provided through the CONNECT family of software. CONNECT supports applications integration and information management, regardless of hardware, software, database, and network technologies. CONNECT dominates 46 percent of its current market, and is increasing its support of hot EC needs such as:

- Intra-networking and Web-centric computing
- Internet gateway and EC document security
- Data access and data warehousing
- Business process re-engineering

PIONEERING COMMERCE ON THE INTERNET

As Internet hosts across the globe number in the tens of thousands and as a new commercial web site opens every seven minutes, there is no doubt that the Internet and the World Wide Web are driving forces in expanding electronic commerce.

"The real advantage of the Internet is that it makes electronic commerce real for more people. They can replace phones, faxes and the mail with e-mail or have easier access to trading partner information, goods and forms through the World Wide Web," says Clark Woodford, Vice President of Business Development for Sterling Commerce. "But companies are just now figuring out how to make these end-user support tools actually roll into an all-day, highly automated production EC environment."

Most corporations are just discovering the Internet, but Sterling is a recognized pioneer for doing business electronically via the Internet. It has helped manage the government parent of today's commercial Internet. It built one of the first commercial Internet home pages. It is a key player in numerous top newsgroups, such as USENET, and manages home pages for NASA and the White House. And the Internet plays a key role in Sterling's internal communications—three years ago, it chose the Internet as its global backbone for e-mail communications,

quickly offsetting millions in communications and infrastructure costs. Today, sales, support and product development operations in more than 70 countries are linked via the Internet.

In 1995, Sterling began supplying commercial products for other companies interested in using the Internet for electronic commerce. Its first foray was to launch an enterprise gateway manager and security product called CONNECT:Firewall. Sterling Commerce is currently expanding its security offerings to management of multiple encryption standards.

In addition, Sterling Commerce has packaged products to help companies take the greatest advantage of the Internet. For example, Sterling's EC Gateway for the Internet combines secure Internet EC with GENTRAN:Server, to better manage the flow of standard EDI and non-standard EC documents.

To help companies quickly adopt the Internet, Sterling's COMMERCE:Network provides a "fast path to the Internet." Through its Internet-enabled COMMERCE:Connection suite of Windows-based software, more than 12,000 trading partners can now communicate via the Internet or other public or private networks.

But one of the hottest areas for Sterling Commerce is the support of

the Internet Electronic Marketplace. Through COMMERCE:Connection, retail storefronts can now be linked electronically with back office electronic commerce operations. In addition to supporting a mixed bag of network access, from the Internet to SNA to dial-up asynchronous communications via PCs, Sterling Commerce plans to soon offer home page services specifically for the electronic commerce market.

The Net and the Web have already proven to be the top place for partnering to capitalize on the strengths of different companies. Sterling Commerce has announced key partnerships and working product offerings in conjunction with organizations like CommerceNet (a non-profit consortium of companies formed to facilitate the use of Internet-based infrastructure for electronic commerce), VISA, SAP, Hewlett-Packard, Microsoft, Open Market, and others.

"We already offer more products for production-system EC over the Internet than anyone else," Woodford adds. "We plan to stay on top by focusing first on automation in processes that don't require human intervention. At the same time we'll deliver easier-to-use products for the times people must be directly involved. You can bet if it involves EC, we'll be there, and we'll be there first."

Business process re-engineering is also a major growth area for the Interchange Software Group (ISG), since it focuses on electronic commerce software for EDI and translation/mapping of messaged applications. The market-leading GENTRAN product family, which today has a 23 percent share of its market (double that of its nearest packaged software competitor), addresses three distinct market needs: 1) EC messaging gateways for companies with large-scale EC needs; 2) EDI Complete for companies needing flexible service and software packages to get started in EDI or EC; 3) EC Desktop solutions that are pre-packaged, push-button EDI enablers for hubs to work easily with smaller trading partners.

Value-Added Network Solutions

Sterling Commerce's Network Services Group is a worldwide provider of value-added electronic commerce network solutions for healthcare, pharmaceutical, hardlines, grocery, retail, trade, transportation, manufacturing and other industries. The COMMERCE software and service product family supports 21 different network-related capabilities and 35 discrete value-added services. It is easily accessible from anywhere in North America, and is expanding globally, from Australia to Europe to South America and elsewhere. The focus of the COMMERCE product family is a suite of value-added services that expands the scope of trading partner relationships. These value-added services also enable small trading partners to utilize electronic commerce through the Internet, while bridging the gap between electronic marketplace (the sale of goods to consumers electronically) and Electronic Commerce (business to business requirements).

"Just ask one of our customers why they needed EC," says Blow. "Then ask them why they chose Sterling. In both cases, the answer is usually simple—their customers, investors and bottom line measurements demand more. So they need more than one solution, one answer from their EC vendor. We plan to keep right on delivering more by partnering with our clients, even as the questions get tougher and tougher." ∎

HOW TO GET YOUR COMPANY TO BE PROACTIVE WITH EC

What does it mean for a company to be proactive and progressive in electronic commerce (EC)? What does EC mean to your business? Here are seven questions that serve as food for thought for any manager or company looking to reap maximum rewards from the technology:

1. What is your EC strategy?
Surprisingly, few companies possess a written plan for EC. Ideally, this plan should come from senior management, or have the support of company leaders. And like any other business plan, it should have periodic, measurable goals and should be reviewed, evaluated and updated regularly.

2. Do you have an EC manager?
Organizations that have the greatest success in EC are often those with a dedicated EC director or manager with an adequate, well-trained EC staff. If the EC manager has a technology background, he or she should meet frequently with members of the functional departments that EC serves; and if he or she comes from a business background, regular consultation with technical personnel is essential.

3. Do you have an EC committee?
In addition to an EC manager and staff, a proactive company will have an EC committee. This committee should include representatives of the IS department as well as the departments that EC serves. Regularly-scheduled meetings should be specified in the EC strategy.

4. How do you evaluate new technologies?
EC technology is changing rapidly. As new technologies and tools are developed and introduced, a company should have a specific methodology for investigating and evaluating them, and for making implementation decisions.

5. How does your company use EC internally?
Is your company reactive, using EDI with a "receive, rip, read and react" approach? Or is it proactive, integrating all types of data into its internal business applications? Proactive companies use EC throughout the business, going beyond the purchasing function to sales, payments, customer service, accounting, inventory management, warehousing, etc. They also can gather EC data to assist with forecasting, planning and marketing decisions.

6. How does your company use EC externally?

One of the best ways to leverage your EC investment is to expand external usage. EC can be extended all along the supply chain, from raw materials supplier to end consumer. Logistics is a valuable area for EC implementation—EDI and bar coding can be combined to aid in shipment tracking and cargo handling and delivery, for example. Some companies are closing the EC purchasing loop by implementing financial EDI and electronic payments. Businesses are also moving EC into their Human Resources departments, utilizing EDI to communicate date related to insurance, pension plans and other benefits.

7. What should you do next?
The best place to begin any EC program is with senior management. Executive support, commitment, understanding, and involvement are vital to successful EC implementation. Once this is accomplished, evaluate your business processes and procedures to determine if they can be improved via EC. Systems re-engineering for EC is also beneficial, particularly if you are installing new EC-related software, or migrating EC-related applications to a new platform.

The Internet Empire: Caveat Emptor

BY SUSAN COHEN

Despite all the World Wide Web hype, organizations have much to learn about reaping returns

In 1995, we heard relentless hype about the Internet, buying on-line and Bill Gates.

The electronic economy was supposed to take hold within the year. Corporate America's knee-jerk reaction was felt 'round the Web as commercial sites exploded from 1,700 in 1994 to almost 20,000 in 1995, according to Web server provider Open Market, Inc.

So in 1996, is anyone turning a profit selling goods or services on-line?

In a word, no. There is not a single large company that has created a profitable electronic consumer channel. International Data Corp. expects 20% of Fortune 1,000 commercial sites to be abandoned in 1996. Why? Because security concerns and ease-of-use issues are keeping consumers away in droves.

Liability limits protect us from being taken to the cleaners when bad guys get our credit cards, but there is no such protection on-line … yet. Security blankets promised by the MasterCard/Visa consortium and others are still one year away. Real-world Netscape bugs, Web snafus and the highly publicized arrest of hacker Kevin Mitnick amplify Jane Doe's concerns about buying on-line.

Home-based technology must also get easier to use. Compare home PCs with another consumer shopping channel: the telephone. Today's PCs and the Internet can't compete. Desktops are stashed away in the office or the den. Even those fluent with http://www syntax get lost. Bottom line: It's easier to order a pizza over the phone than to boot the PC, launch the browser, log onto Pizza.Net and order the pie.

So what should a company do if it doesn't want to be left behind in the electronic economy? My advice: Wait, watch and learn.

WAIT. Companies have nothing to lose by biding their time before jumping into electronic commerce. In cyberspace, there is always room for one more. If you already have a Web site, limit Web spending to basic updates until you establish concrete measures of expected return. Electronic commerce metrics should quantify the costs of customer acquisition, sales execution and after-sales support. To calculate an accurate ROI, be sure to distinguish between revenue increases due to new customers and those due to customers switching from other sales channels.

WATCH. Don't be blindsided by competitors. More than any other business environment, the Web and the Internet offer companies an unprecedented opportunity to eavesdrop on rivals. At a minimum, your adversary's marketing posture and deal structure will be displayed in all its multimedia glory.

LEARN. Cybermarketing smarts are the single most important skill your company needs to succeed. This requires breaking down the walls between Sales & Marketing and IS. Together, marketers and technologists must create flexible deals and eye-catching Web pages. Turn the 'net denizens loose defining your external network policies and architecture.

As for me, I'm a typical consumer. Until my credit card is safe and intelligent agents make finding what I want easier, count me out. ◀

Cohen is president of The Aarons Group, a Marblehead, Mass.-based client/server education and consulting firm. She can be reached at (617) 639-1394.

READING LIST

▶ **Internet Demographics Survey,** Oct. 30, 1995 CommerceNet/Nielsen, Menlo Park, Calif. (415) 617-8790 or E-mail info@commerce.net

▶ **"Electronic Commerce: Trends and Opportunities"** *by Linda M. Applegate, Harvard Business School, and Janis Gogan, Bentley College.* Harvard Business School Case #9-196-006, Oct. 6, 1995 (800) 545-7685

▶ **"Paving the Information Superhighway: Introduction to the Internet"** *by Linda M. Applegate, Harvard Business School, and Janis Gogan, Bentley College.* Harvard Business School Case #9-195-202, Oct. 6, 1995 (800) 545-7685

'Net Legalities Loom Large

In addition to **BANDWIDTH** and **NETWORKS,** companies embarking on the **ELECTRONIC** commerce trail have the **LAW** to deal with

AS WE ENTER THE ERA of doing business on the Internet, the legal ramifications of such transactions are undergoing scrutiny. While the legalities of doing business face-to-face or via catalogs have been firmly established, the Web's advent has made legal issues such as who is responsible for mistakes and authentication key concerns for 'net pioneers.

In an attempt to shed some light on a few of the issues surrounding electronic commerce, we went straight to the source — the legal professionals who are entrenched in these disputes daily.

The following is a discourse by two legal minds on the contentious issues of policing the Internet, Internet boundaries and whether our judicial system can handle electronic commerce.

LANCE ROSE ESQ. is the author of "NetLaw," an on-line services and Internet legal guide, and an attorney at Lewis and Roca LLP in Phoenix.

DAVID W. PHILLIPS is associate general counsel for America Online, Inc., principally responsible for intellectual property, privacy and information law matters. He is also co-chair of the American Bar Association's new Subcommittee on Interactive Services.

Can the Internet be policed?

ROSE: The Internet can and will be policed, though not perfectly. Just like in physical cities and neighborhoods, cybercops can't be everywhere, but they will cut down on crime just by walking (or perhaps surfing) the beat in on-line neighborhoods. However, many on-line areas, such as BBSs and large on-line services like America Online and Prodigy, are private. It's not really up to government or the police to maintain order in these private places. On the other hand, the Internet and World Wide Web are very much public places, and it makes sense to find police there.

Just who are the "police" on-line? So far, it seems like everyone wants to get in on the act. Sure, the Postal Service made its play. However, we have also seen on-line police activities by the Secret Service, the FBI, U.S. Customs, the Federal Trade Commission and various state police forces, to name just a few.

The states have also been very active. There was even a Web page in which the Attorney General of Minnesota declared that if anything on the 'net was illegal in Minnesota, it could be prosecuted in Minnesota. Globally, we are also now seeing things like the recent rumblings in Germany about censoring Usenet newsgroups with sexual content or Nazi imagery and declarations by the Chinese government that all 'net connections to the world must be through conduits approved or controlled by the gov-

ernment. In short, the 'net is filling up with plenty of police of all kinds.

PHILLIPS: I agree that, just like in the physical world, a variety of federal, state and foreign government agencies and organizations will police cyberspace. "Netizens" and commercial stakeholders of the 'net welcome responsible government policing that will safeguard users and impose the security necessary to conduct commerce over the 'net.

However, government agencies must not impose burdensome regulations that ignore both the fundamental differences of this medium and constitutional rights. For example, the recently enacted Communications Decency Act extended in procrustean fashion telephone regulations to cyberspace. By blindly disregarding basic differences between telephone calls and computer network exchanges, the Act undermines core First Amendment free speech rights.

While I agree that foreign governments are now reacting to what they perceive as threats caused by unrestricted access to the Internet, the 'net is premised on a routing system that treats localized blocks as systems failures and provides for rerouting data around government censorship gates. Yet if allowed, certain governments will continue to attempt to control it. International standards must be developed to harmonize regulation of the 'net and coordinate regulatory actions.

Just like in the physical world, policing requires cooperation and coordination from private communities. The communities that make up the 'net have a stake in patrolling their virtual neighborhoods. In fact, they are in the best position to do so by reporting illegal activities and deterring harmful conduct.

The Internet has no boundaries, so how are things such as tax laws and interstate commerce laws monitored and/or should they be?

PHILLIPS: Networked communities not only challenge the notion of federalism in the U.S. but also the very idea that any one nation state can rationally or effectively regulate network activities in

isolation. In the early days of our republic, the imposition of a myriad of state laws threatened to choke burgeoning interstate commerce. Similarly, regulation of interstate and international transmission of content, communications and commerce over digital networks threatens to undermine developing commerce over global networks.

Like international laws regulating global waters or airspace, international solutions must be adopted to provide the necessary infrastructure to allow the free exchange of information, goods and services under a common set of rules.

Like the effort to establish firm international trading rules, the emerging commercial stakeholders of the 'net must organize to prevent local and national governments from imposing inconsistent and irrational regulation of cyberspace. The creation of global standards for the regulation of cyberspace will be an evolutionary process. This process will be hastened if commercial stakeholders of the 'net can effectively convince their national governments that the piecemeal imposition of regulation will undermine an essential tool for global and national economic growth and job creation.

ROSE: Nations and states may not have as much power as they're accustomed to in the on-line world, but they will certainly wield their existing, traditional physical powers any way they can. They will continue to view their mission as protecting those who live in their geographic boundaries. From that perspective, "cyberspace" is just a fiction shared by in-state citizens sitting like couch potatoes in front of their computers. If something disfavored by a state in the U.S. happens on-line, such as illegal gambling operated on the Web from offshore computers, the state will exercise whatever power it has to shut it down and protect that state's citizens.

States will probably also end up seek-ing to attach identity stickers of some sort to users. Think of this as the flip side to digital signatures. Leaving aside the Orwellian privacy implications, this leads to a fascinating thought: State and national borders may arise in cyberspace, not in the form of geographic outlines but as signs of nationality stamped on each user's digital persona. If a user's home state does not allow access to certain on-line areas or activities, the nationality sticker on his or her virtual forehead will interact with the local on-line system software to keep him away from the forbidden places.

A separate question is whether we need the same kinds of government regulation on computer networks as we have had traditionally in the physical realm. For instance, national governments are needed to create a physical transport and trading environment organized enough for physical commerce to thrive. Do we need this sort of government help on-line? Or can companies on the 'net, with its cheap and easy information flow, organize their own trading and transport environments economically without government involvement? The 'net may offer a new, true opportunity for realistic government shrinkage if the politicians will allow it.

Has the judicial system evolved enough to handle electronic commerce-related contractual disputes?
ROSE: We routinely make deals over the phone with people we've never met. For some reason, though, contracts on the Internet make many of us far more nervous than telephones ever did. People today are just plain apprehensive about Internet transactions, despite the fact that our current laws are open-ended enough to handle on-line contracts without much problem. Luckily, the forces of on-line commerce are rapidly turning this into a nonissue. Companies such as VeriSign and others are now rolling out "digital

certificates," which will enable us to verify the identities of those with whom we wish to deal. In addition, we are starting to see legislation that seeks to set up standards for acceptability of digital signatures and the like. In any event, if digital certificates and other on-line certification methods become common in the future, regardless of whether we needed them in the first place, then we may all be forced to use those methods if we want our own on-line contracts to be considered valid.

PHILLIPS: With the increasing widespread adoption of digital networks, current requirements for written signatures or written authorization under many statutes and regulatory schemes make little sense. To ensure that laws do not thwart the development of electronic commerce, judges should apply current statutes in ways that give effect to their underlying purpose rather than to formal requirements. If not, the law will bear little resemblance to commercial practices.

It's commonplace in the U.S. to order goods through catalogs using a credit card. Is oral authorization the equivalent of a written signature? Are such orders binding even if the process is susceptible to fraud? The catalog and credit-card companies deal with such risks and contingencies as a cost of doing business. Internet merchants and providers will do the same. Nevertheless, there is a real need to create legal standards governing electronic transactions.

The manufacturing community embraced electronic data interchange only after the necessary legal infrastructure was built. Today's on-line merchants and providers must build a similar infrastructure that will provide the foundation necessary to transact and do business over digital networks.
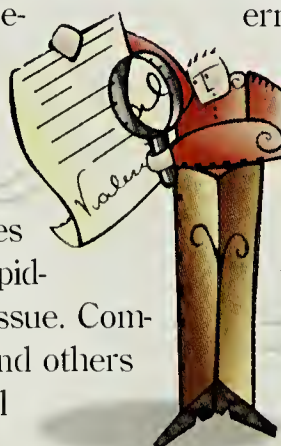
CAN ONE
ELECTRONIC COMMERCE
COMPANY BRING
EVERYTHING
TO THE TABLE?

JUST ASK US. At Kessler Industries, you'll find everything from patio sets to tables for two. And thanks to Sterling Commerce, Kessler can get everything it needs for electronic commerce from a single source, too. That's why the metal furniture manufacturer invited Sterling Commerce to sit down with them. As Bernard Griego, Kessler's EDI Coordinator, tells it, "Sterling's one-stop-shopping solution — software, services and training — makes sense for us." So does performance described as "cost-effective," "easy to use" and "trouble-free."

And benefits like improved customer service, labor savings and increased accuracy aren't the end of the line for Kessler Industries. Using the tools Sterling Commerce has provided, Kessler is now designing an electronic UPC catalog and plans to add at least 50 EDI partners — creating a comprehensive, integrated electronic commerce program that has their company sitting pretty.

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COMPANY REFERENCES

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Off THE Books

PREDICTIONS

BANKING

In the age of electronic commerce, banking is becoming more self-service-oriented. As people get used to doing things themselves, how will banks bring in revenue?

"Banks need to move their product offerings into higher value-added territory: investment products, asset management and financial planning. Technology can help, integrating personal service with automated channels. While banking on-line, customers using interactive financial profiling tools could be directed to bank financial consultants for more information about products. Bank Web sites could create awareness and generate comfort with new financial products that traditional customers might not be familiar with." — *Iang Jeon, vice president of electronic commerce, Liberty Financial Cos., Boston (based on research done at Forrester Research, Inc., Cambridge, Mass.)*

TELECOM

Now that carriers are hosts for Web-based services to allow electronic commerce, will they step in and do it for small companies that can't/won't do this for themselves?
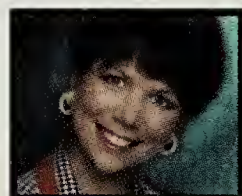
"All major carriers now offer managed network services. These programs are targeted at two markets: the middle-market customer that wants to focus on its core business and doesn't have the resources to manage its WAN and the very large corporations that have/are growing global networks for data resources and know how complicated this is and want to outsource. All carriers exceeded their expectations in their business plans over the last three years and see this business growing with frame-relay sales." — *Christine Heckart, director of broadband consulting, Telechoice, Inc., Verona, N.J.*

MEDIA CONVERGENCE

Do you see a convergence of all different kinds of media so that we will one day see Internet service come in over the TV?

"When it comes to appliances, I do see them merging. Already computer hardware is capable of getting full-motion video onto the screen, so the boundary between the computer and the TV is blurring.

"In fact, you should not have to think about what channels or technology are used [for communication]. You should just ask your appliance for something, and it will see to it without you being aware of the technology it is using. And let's face it, that appliance will be a computer (not a TV)." — *Tim Berners-Lee, World Wide Web Consortium, MIT, Cambridge, Mass.*

Mile*stones*

MARCH 1989

The World Wide Web is born at the CERN physics lab in Geneva to help physicists around the world collaborate on research projects.

APRIL 1994

Netscape Communications Corp., developer of the most popular 'net browser in use today, is formed. CommerceNet, a Menlo Park, Calif.-based consortium that promotes business on the Internet, is also formed.

FALL 1994

Oracle Corp. begins to sell Personal Oracle7 and PowerObjects via its Web site.

MAY 1995

The Big Three long-distance carriers as well as several Bell operating companies make plans to reserve portions of their public networks on the Internet for secure electronic transactions.

JULY 1995

The U.S. Postal Service and Premenos Corp. test digital signatures for authenticating EDI users over the Internet. The Postal Service hopes to become the EDI industry's national certification authority.

AUGUST 1995

A student at France's Ecole Polytechnique cracks the encryption software in the 40-bit version of Netscape's Navigator browser. Netscape blames the problem on the government's prohibition against exporting the 128-bit version. Pending legislation will ease the problem, according to experts.

SEPTEMBER 1995

Premenos announces Templar for Windows, the first security solution for business-to-business EDI over the Internet.

SEPTEMBER 1995

AT&T Corp., Dun & Bradstreet Corp., General Electric Co. and the U.S. Chamber of Commerce announce an on-line service to allow businesses to line up suppliers, negotiate contracts, conduct bidding and arrange for delivery worldwide.

OCTOBER 1995

BankAmerica Corp. and the Lawrence Livermore National Laboratory successfully test secure payment requests for the federal government. The test uses both digital signatures and public key encryption.

FEBRUARY 1996

MasterCard and Visa mend fences to promote a single-payment method for Web-based electronic commerce.

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